# The Trade Review and Western Machinist.

FIFTEENTH YEAR.

**The only strictly Manufacturing, Industrial and Scientific Paper published in Ohio.**

OFFICIAL ORGAN OF THE OHIO INSTITUTE OF MINING ENGINEERS.

PUBLISHED EVERY SATURDAY

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MANAGER.

Publication Office—Cor. Bond & Superior Streets,

CLEVELAND, OHIO.

**Subscription, (Postage included,) $3.00 per Year.**

Entered at the Post Office at Cleveland as second-class matter.

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| One Inch, one time | $1.50 |
| One Inch, three times | 3.00 |
| One Inch, one month | 5.00 |
| One Inch, three months | 10.00 |
| One Inch, six months | 17.50 |
| One Inch, one year | 30.00 |



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### *ELECTRIC MOTER POWER.*

When men of science allow imagination to get the upper hand, they are apt to indulge in nonsense. We notice that Sir Henry Bessemer has launched out into the possibilities of supplying motive power to the manufactories of England to be supplied for hundreds of miles direct from the mines. He says: "Why should we not at once connect London with one of our nearest coal fields by means of a copper rod of one inch in diameter and capable of transmitting 84,000 horse-power to London and thus practically bring up the coal by wire instead of by rail?" Concerning this proposition an English exchange, assuming that each horse-power can be generated by consumption of three pounds of coal per hour, and that the engines work six days and a half per week, estimates "that there would be required an annual consumption of coal equal to 1,012,600 tons to produce the result. Now all this would, in the case assumed, be burned at the pit's mouth at a cost of, say, six shillings per ton for large and two shillings per ton for small coal; that is, at less than one-fourth the cost of coal in London. This would immensely reduce the cost of electric light and of the motive power now used in London for such a vast variety of purposes. At the same time it would save the city from the enormous volumes of smoke and foul gas which this million of tons of coal would make if burned in the city." All this is very fine, but Edison has lately demonstrated to the satisfaction of every scientific man who has read his views, the adsurdity of the scheme lately propounded by which the power of Niagara Falls was to be turned to account in driving mills throughout the country, even as far as New Orleans. The great inventer pointed out that owing to the power of the electric current that would be required to be generated, it would be at the hazard of the mens' lives who would supervise the dynamo electric machines; and that were it possible to secure the working of such machines, the cost of plant, including enormous copper cables, would be ruinous to investors. Dynamo machines must be applied locally to be worked successfully.

### *POOLING OF RAILROAD TRAFFIC.*

Railroad confederations for pooling arrangements now constitute one of the most important agencies of the trade of the country, and hence commanded a larger share than ever of attention during the last railroad war and since. The confederation, called a pool, is the establishment of a sort of government for the apportionment of traffic, the establishment of rates for the various classes of goods and the maintenance of rates; the determination of the routes which traffic should take from point of shipment to destination, the division of proceeds over several roads in every case of joint service, the rendering of returns, and many other matters arising in the detail of railroad management. Although the pooling of traffic subserves many important purposes. The main bond of union is a formal or informal understanding as to the share of the competition traffic which each road shall carry. Some pools are simply leased on a division of the tonnage transported; others on a division of receipts of traffic. That pooling has its advantages is on all hands conceded.

Wars of rates arise from none of the competitors being satisfied with the share of the competition traffic which is secured, and the ends resulting are not confined to the companies themselves. The public interests suffer and bitter complaints arise on account of the unjust discriminations made by the relative difference between the low "through" or competitive rates and the comparatively high "local" or non-competitive rates, besides which no shipper on one day knows what rates will prevail the next, nor what his competitor in trade is paying for transportation services. The practical working of unrestricted competition has never been satisfactory, owing to its introducing constant elements of uncertainty into business operations, attended with violent fluctuations. The effect is thus described in the last report of the Bureau of Statistics:

"During railroad wars the general freight agents, or other executive officers, upon whom properly devolves the matter of determining rates, invariably remit their authority to a great number of soliciting agents and local freight agents widely scattered in all parts of the country; the only order promulgated for their guidance at such times being to make any rate which may be found necessary in order to secure traffic. Although this method of procedure is obviously in the face of good administration, of order and of economy, it is found to be an unavoidable feature of a war of rates. During these struggles success waits upon intrigue and false representations. The freight agents deceive the merchants, and the merchants deceive the freight agents."

On the other hand, there is a great temptation on the part of the members of the pools to unduly enhance rates, against which there would seem no effective protection, the functions of the members of the Government Railway Commission being in this respect advisory and not executive. In the circular which has just been sent by Commissioner Fink to the managers of western lines belonging to the executive committee relative to the adjustment of differential passenger fares, he suggests the amount of these according to accommodations furnished, and the different roads and trains from St. Louis, Chicago, Cincinnati and New York, but adds: "How thesedifferent rates are to be put in practice is also to be further considered. No difficulty presents itself in regard to passengers taking trains at points where the different rates are established, but it will be difficult to arrange for through passengers from points beyond, and you are requested to take this matter into consideration and suggest such plans as you may deem practicable. The question of grading the different fares from intermediate points will also have to be further considered." These are the real difficulties which pooling arrangements have hitherto failed to meet.

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THE determination come to in Washington by the Senate Republican caucus to vote solidly for the reduction of the duty on Bessemer rails from $28 to $20 per ton is just now an especial subject of concern with the manufacturers both of steel and iron rails. The decision has been come to on the ground that otherwise the amendment of the Kentucky Senator, Mr. Beck, reducing the duty to $14 per ton, would be likely to be carried. A long tariff discussion in the Senate is now imminent. The indirect effect of the proposed reduction on iron rails is thus commented on by Mr. Joseph D. Weeks, Secretary of the Iron and Steel Association: "The caucus has decided to reduce the duty $8 per ton. Possibly the price of rails will thereby be reduced $5 per ton, making the price of a ton of rails about $45. In order to make any profit there must be a reduction in the price of pig iron, or the manufacturers must go abroad to buy this necessity. Pig iron cannot be made at any lower price than it is now sold, unless the price of ore is reduced, and manufacturers made their contracts for ore for the year last winter. A reduction in the price of rails must inevitably follow a reduction in the price of steel rails, and iron rails cannot be made at a profit to be sold at $38 or $40 per ton. Hence it logically follows that makers of iron rails must either close their mills or begin the manufacture of bar or merchant iron. They have not got the plant to make steel blooms for rails, and it would take them a long time to put in a plant. If the iron rail manufacturers begin to to make bar iron, the strikes are settled, and a big stock of goods is thrown upon an already overstocked market. I fear there will be serious trouble ahead for our people. Neither the knit goods men nor the hoop iron men are in any way responsible for the reduction of duty on steel rails, and I think all of us deprecate it, but the knit goods bill could not have passed the Senate without the hoop iron amendment, and when the internal revenue bill is the vehicle upon which the reduction on steel rails is to be carried, the passage of the knit goods bill in the House without the hoop iron amendment afforded the opportunity for the reduction on rails that now seems certain to be made."

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THE strike in the western iron districts, mainly on behalf of puddlers, has drawn increased attention to the possibility of superseding the puddling process altogether. It would be premature to affirm that this will soon be realized, but there can be no doubt it will be carried out. Our correspondent in England writes that experiments there have been carried out by which four tons of ordinary cinder iron were converted into superior steel. He points out that the achievement in itself is no novelty, Mr. Sharman, an American, having in 1874 done the very same thing without, however, rendering it a commercial success.

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THE speculative markets are active, and higher figures are recorded for all kinds of cereals and provisions. These high figures in the face of the growing crops indicate that some speculators do not take a favorable view of those prospects. The movement in wheat has been somewhat affected by the anticipation that the Egyptian troubles will interfere with Europe's Indian supplies.

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THE saving of fuel in driving engines offers one of the most tangible points to aim at for compassing economy in this day of competition. Conditions under which fuel is burnt varying with the character of the raw material preclude the laying down of any absolute data which shall be applicable in

all instances, but there are general principles which need to be kept in mind, derived from tests which determine what are and what are not well arranged boilers, and certain methods of feeding which are found to be attended with satisfactory results. There are a multitude of facts available which bear on this subject of economy of fuel. No manufacturer who can afford a change should long put up with boilers of faulty design, such, for instance, as those of the plain cylinder type, many of which remain in use. As to these we are enabled to furnish the following illustration: A factory which formerly used twenty plain cylinder boilers consumed sixty tons of coal per week. These have recently been replaced by six tubular boilers of improved construction, and the consumption of coal to do the same work is now only thirty-six tons per week. The saving in coal will amount to 1,248 tons per year, worth $6,450. The cost of making the change was $10,000. The reduction of the temperature of escaping gas, so as to secure additional heat to the feed water is of the first importance. Without any necessity of changing boilers there are numerous appliances for this end. It is indisputable that if an economizer reduces the temperature of the escaping gases three hundred degrees, it will heat the feed water two hundred degrees, and increase the evaporation for the same amount of fuel about twenty per cent. Boilers which entail loss through the rate of combustion in the grate being too slow can be much more economical by reducing the grate surface, a matter which involves but slight outlay. All manufacturers should see to it, in their own interests that the fire is properly managed. Carelessness and ignorance of the fireman are causes of much waste of fuel. An efficient fireman supplies the furnace with coal in such a manner as to keep the grate constantly covered at a uniform depth; he regulates the draft so as to maintain an unvarying steam pressure, and he cleans the fire of clinkers and ashes without admitting an unnecessary amount of cold air, or wasting unburnt fuel through the grate. Watch can be kept over the foreman's efficiency by the use of a registering pressure guage, and by a suitable system of recording coal consumption from day to day, and the waste from ashes. An efficient foreman will produce from eight to ten per cent. more steam from the same amount of coal than one who is careless. Of many fuel saving appliances in the market there are many that are ineffective and wasteful. The greatest care should accordingly be taken in selecting a feed water heater. A suitable heater should raise the temperature of the water to 210 degrees. Each ten degrees below this temperature represents about one per cent. increase in the consumption of fuel. The careless regulation of the draught by the fireman, or the inefficiency of a damper governor, causes waste of fuel by imperfect combination of the gaseous product. In either case of regulation, the damper is set first wide open, and then entirely shut. Each time the damper is closed on the intensely ignited fuel, the gases become suddenly choked and pass off without a sufficient supply of air for combustion. Further loss may be entailed, not only from a faulty design in an engine, but from derangement of valve gearing and pistons, causing leaking, and from defective cylinder condensation. All loss at the engine should be looked into. Plain slide-valve non-condensing engines—in short, all engines having a fixed cut-off, or none at all, and governed by a throttle valve have been generally discarded, for a good automatic cut-off engine will consume only half the amount of coal of the former, and save enough fuel in eighteen months to pay for the change. We would point out that many engines of an economical type entail loss through being improperly proportioned to their load, and we are constantly encountering engines in our visits to manufactories which work under wasteful conditions of steam pressure, cut-off, &c. Derangement of valve-gearing is of very common occurrence, and is caused by wear of boxes and connections, and by adjustments intended for improvement made by incompetent engineers. The indicator diagram, to which we shall refer in a future article, furnishes the only correct indication of the adjustment of the valves, and is the simplest guide for correcting derangements.

IT IS to be hoped that Mr. Hill, of New Jersey, a chief leader of the cheap postage movement in Congress, will succeed in the final days of the present session in securing the passage of a bill for the reduction of letter postage to two cents. Any deficit thus occasioned would compensate by the accruing advantages. We would but follow the example of other countries, particularly England, which has been a large gainer by her two-cent inland postage. This low rate has been found to increase bunsiness by encouraging correspondence. Almost every individual in the nation would be benefitted by the proposed measure, and this alone constitutes a strong argument in its favor. Postage is a tax, and a necessary tax, but of all taxes it should be the first to be lightened.

## MANUFACTURES.

### TO MACHINISTS, MANUFACTURERS AND OTHERS.

THE publishers of THE TRADE REVIEW solicit items of information concerning manufacturing and other establishments in any part of the country, and all such items will be promptly inserted in these columns, free of charge. Facts are the only things needed; and all communications should be accompanied with the name of the contributor—not for publication—but as a guarantee of good faith.

Manufacturers, machinist and engineers are particularly requested to communicate any matters of interest relating to their specialties. No one need be deterred from sending any interesting facts in his own language, as all such contributions will be properly revised before sending to press.

### OHIO INDUSTRIES.

Williams Bros., Kent, have commenced operations for the erection of a 33x96 brick addition to their flour mill.

The Wooster Stone Co., Wooster, will shortly commence operations. They will give employment to about fifty men.

Johnson's paper bag factory at Middleton has closed for repairs. There will be five new machines put in for the manufacture of sacks, with a running capacity of 100,000 sacks for each machine daily. The machines make the sacks complete, and dry them ready for packing. This will do away with the help of about forty girls.

Smith & Teachout, boiler makers, Cleveland, are turning out some of the best work in this branch of the iron trade in the West. The works, situated on Broadway, are convenient, commodious, and extensive. At present the firm employs thirty men, all of whom are skilled mechanics. They manufacture boilers of every description, stationary and marine, oil tanks, etc. Among the orders they have recenty filled was a boiler for P. Smith's new tug, one 72x16 for the Cleveland Axle Works, two boilers 65x18 for parties in Middletown, O. The firm have orders ahead for three months, and expect a busy season.

VODREY BROS., East Liverpool, have just completed a new antique toilet set "Nestor" shape, which will be put on the market at once. It is very neat and pretty, and will no doubt take well with the trade. They are also making changes in other wares which they manufacture.

THE Ohio Lantern Co., Bellaire, a short time ago purchased the old national bank building on Union street, and began the manufacture of lanterns. They will build a brick addition 85x32 feet, three stories high, and will employ 50 men and boys.

OUR Piqua correspondent writes: The machine works of W. R. Bowdle, manufacturer of steam engines, mill machinery, shafting, &c., employ 14 hands. The works were established in 1848. The trade is principally local.

THE Dayton Screw Works have gone into full operation.

DURING the month of May the Railroad Speed Recorder Company, Kent, shipped 72 machines and printed over 1000 pounds of charts. They have ordered five tons of chart paper, which is expected to arrive soon. The machines at once become permanent fixtures wherever introduced. They are now running on full time with orders on hand from the Chicago, Rock Island and Pacific; Northern Pacific; Chicago and West Michigan; Chicago, St. Paul, Minneapolis and Omaha; Texas and Pacific, and two or three other roads.

OUR Clyde correspondent writes: The Clyde Organ Manufacturing Co., manufacturers of the improved celebrated organ "Dynamicon," who have been established a little over a year, employ 35 hands. Last year they erected a handsome brick shop, three stories high, 125 feet long, and 44 feet wide. The engine house attached is 40x20 feet, and the warehouse 20x44 feet. Trade is reported fair. The Company turns out about 50 organs per month. The works are admirably situated, both for delivery of materials and shipments by railroad, being close on the Lake Shore. Mr. S. Wickwire is President, Mr. P. W. Parkhurst, Treasurer, and Mr. S. M. Terry, Secretary.

## INDUSTRIES IN GENERAL.

### MASSACHUSETTS.

The Standard Rubber Works at Campello have commenced operations with 125 hands.

The National Tube Works are now employing forty men at their factory in East Boston.

The Mason Machine Works at Taunton are to build 500 looms for the Metacomet mill, Fall River.

The Hall Rubber Company at Watertown has begun the construction of its new factories.

The Murdock Parlor Grate Company is erecting a brass foundry at South Carver.

The Chemical Paper Company, of Holyoke, has just received 10,000 pine logs, which will be ground into pulp.

The foundation to the addition of the Morse Twist Drill Works, at New Bedford, is finished and bricklaying commenced.

The large manufactory for the production of water colors at Readville, Hyde Park, has secured all its plant, and will shortly commence work.

Brockton now has an industry which has long been needed, and that is a foundry for smaller first-quality castings. The Campello Foundry Company have just commenced operations in their new buildings, just east of Campello station.

A building in Cambridgeport, fitted up for and formerly used as a brass foundry, has just been taken by a concern known as the Cambridge Brass Foundry, who will begin operations this week. All sorts of jobbing work will be attended to, as well as steam engine, mill and mining machinery brass work. The foundry is capable of twelve tons of castings per day.—*Boston Commercial Bulletin.*

Bradley & Sons have resumed work at Cummington. They are making penholders for steel pens at the rate of 18,000 a day. The processes are not quite as many as in making pins. The beech logs are sawed into three-inch plank. These are cut into blocks about three feet long, which are subsequently cut into pieces a quarter of an inch thick, and these are cut again into square slots. These are put through what is termed a rounder. They are then cut suitable lengths and shaped by another machine. They are next put in a wooden cylinder, which holds 28,000, the coloring matter is put in, and by a rotary motion they are painted. Another machine polishes them. They are packed in barrels—a barrel will hold about 15,000—and sent to New York, many of them going to England. —*Boston Manufacturers' Gazette.*

The armory of Springfield requires a large amount of raw material. A good idea of it can be formed from the advertisement for bids for supplies to carry on the business of the fiscal year, beginning July 1. Some of the materials advertised for are 275,000 pounds of steel, 230,000 pounds of gun steel, 30,000 pounds of iron castings, 4,000 pounds of musket powder, 2,100 pounds of cotton waste, 4,200 pounds of nails, 1,700 pounds of wire, 2,600

feet of leather belting, 140,000 feet of boards and planks, 1,300 tons of coal for armory and 700 for the water shops, 30,000 bushels of charcoal, 4,750 pounds of emery, 25 barrels of soft soap, 10,000 pounds of sulphuric acid, 100 gallons of alcohol, 5,000 pounds of sal soda, 170,000 pounds of ground bone, 2,000 pounds of glue, 1,000 pounds of white lead, etc.—*Boston Com. Bulletin.*

RHODE ISLAND.

The National Rubber Company's new building at Bristol will be of brick, three stories in height, 450 feet on Wood street and extending 60 feet in the rear. The Rubber Company is also laying the foundation for a building east of its establishment on the site of one of its former granite ledges. The large balance wheel weighs 60 tons; the engine is 800 horse power.

The firm of William H. Haskell & Co., the screw manufacturers of Pawtucket, R. I., has been incorporated under the style of William H. Haskell Company, with William H. Haskell as president, and E. S. Mason as treasurer. Mr. Mason has been associated with Mr. Haskell for the past eighteen years, during which time the business has been steadily increasing, and the style is changed to afford still greater facilities for its future growth.

NEW HAMPSHIRE.

The Concord Axle Company have commenced another enlargement of their works at Fisherville by adding more room to their steam hammer and forging shops.

CONNECTICUT.

The directors of the Corbin Cabinet Lock, New Britain, will commence work in their new factory building on or about September 1.

The Yale Lock Company, of Stamford, has acquired Emery's testing machine patents, under which the famous Watertown machine was built, and a fifty-ton machine is now building for the Altoona shops of the Pennsylvania Railroad.

The Springfield Company, of Rockville, has stopped work for a while. It has a surplus of about $40,000, and its rule is to run, even without sales, in panics or flush times, until this surplus is expended. The works are then stopped to start again when the stock is disposed of.

NEW YORK.

A new stove manufacturing concern has recently organized at Peekskill, to be known as the Sanford National Stove Works. The works were originally started nearly half a century ago, but the present management is new.

NEW JERSEY.

A second German silk manufacturer will settle in Paterson, to make ribbons, ties, etc. His capital is said to be large.

PENNSYLVANIA.

The dimensions of the new hardware foundry at Allentown are to be 50x100 feet; main building, two stories high, 35x80 feet; $22,400 has been subscribed.

A 3-ton hammer that was put into the Reading Railroad Company's steam forge at Bingaman street, nearly fifty years ago, has just been removed, and a new perpendicular steam hammer, capable of striking a blow of about 4,000 pounds, is being put in its place. The anvil, weighing twelve tons, has been put in position on a massive foundation.

There are 2,700 hands employed in the Bessemer steeel works at Seelton, Dauphin county.

The stock of the Westinghouse Machine Company, Pittsburg, has been increased from $200,000 to $350,000.

Philadelphia manufactures more umbrellas than any other city in the world; the annual production is valued at $10,000,000.

Four new rolling mills will soon be completed in this State, extensions are being made in several more, and blast furnaces are being repaired and improved.

There are now employed in the Baldwin Locomotive Works 3,000 men, with a sufficient number of orders to keep them busy during the entire year. Locomotives are being turned out by the firm at the rate of 600 a year.

The large rail mill of the Pennsylvania Steel Company, at Steelton, near Harrisburg recently made 1872 rails in twenty-four hours, averaging forty-seven seconds for each rail. This was done in 124 heats, aggregating 468 tons of metal.

MARYLAND.

The Standard Can Company, of Baltimore, the incorporation of which we noted some time ago, have their machinery in order and are now ready for turning out 40,000 very superior cans a day. The patent machinery used by this company enables them to effect a great saving in labor, a few girls being able to do almost the entire work.

MICHIGAN.

Among the new industries to be started at East Saginaw this season are a large saw and file works, an axe and tool factory, and a large furniture factory.

Our Detroit correspondent writes: At the Fulton Iron and Engine Works are manufactured as specialties engines and saw mills, also blowing engines for blast purpose. The works were established in 1851, and employ 100 hands. A large business is being done in car-brasses under the Hopkins patent. Shipments are made principally in Michigan. The bronze car journal bearings cannot be equalled. Steam pumps, shafting, and pulleys are also manufactured. Mr. John S. Newberry is president, Mr. James McMillan secretary, and Mr. J. B. Wayne, manager and treasurer.

ILLINOIS.

The new wire mill of the Union Iron and Steel Company, Chicago, is in full operation, employing about 300 men. The output is sixty tons of manufactured wire per day.

A new steel-manufacturing city will be created by a Syndicate in the coal region of Southern Illinois. It is said that $1,500,000 has been expended in the purchase of mines and railroads.

The factory of the Chicago Rubber Company, the only works of the kind west of Boston, is in full operation at Grand Crossing. About thirty men are employed, from 4,000 to 5,000 yards of the finished material are turned out daily, and from 800 to 1,000 rubber garments.

The Plano Manufacturing Company, Plano, employ 250 men. Their harvester and twine-binder have had some valuable improvements this season and the demand for them is large. The foundry is being operated fourteen hours a day. This company contemplate an extension of their works.

The Kelly Steel Barb Wire Company, of Chicago are putting in new machinery, in order to enable them to keep up closer with their orders, which are rapidly accumulating. This company find difficulty in procuring plain wire, owing to the strike, but when they can obtain it readily they run their works day and night.

The Sandwich Enterprise Company, Sandwich, are now employing 125 men. Within the past three months this company have commenced the manufacture of the Kittleson barb wire. They are building four more wire machines, and expect to turn out 200 tons a year. Eight thousand cultivators and 1,500 wind mills have been made by them this year, and an extension of the works is in contemplation.

INDIANA.

The Phœnix Foundry and Machine Company, of Terre Haute, are about to go very extensively into the flouring mill machinery business, not however to the exclusion of their usual general machinery trade.

GEORGIA.

T. J. Petor, of St. Louis, Senator Plumb, of Kansas, and other gentlemen, have purchased $500,000 worth of Georgia coal and iron lands, and will erect coke ovens and a blast furnace; they having already completed a nail mill with a capacity of 500 kegs per day.

TENNESSEE.

There are twenty-five copper furnaces in Tennessee that turn out an annual yield of 2,600,000 pounds of copper.

The Chattanooga Stove Company has recently been organized. The stock subscriptions to date amount to $30,000, the company reserving the right to increase the amount of capital stock as occasion demands. The company hope to be in operation by September. They have secured Mr. W. W. Baldwin, the general manager of the Cleveland Co-operative Stove Company, as general manager of their works.

COLORADO.

The Superintendent of the Colorado Coal and Iron Company announces that they are turning out 70 tons of steel rails daily, and are preparing for an output of 80 tons.

Denver is rapidly advancing in manufacturing industries. It has planing mills, rolling mills, iron and brass foundries, breweries, flour mills, and turns out carriages, harness and saddles, confectionery, crackers, vinegar and pickles, marble works, pork packers, gloves, fire clay, leather uppers, saddle trees, soap, mattresses, jewelry, iron fences, mining machinery, tinware, boilers, cornices, boots and shoes, trunks, cigars and brick. The annual product varies in value from $5,000,000 to $6,000,000.

The Ohio Central shops at Bucyrus, have just turned out a new locomotive, the first of five they are building; they are eight wheel engines, with 17 x 24 inch cylinders, driving wheels 61 inches in diameter, the steel tires being 3 inches thick; they have 166 wrought iron tubes, 2 inches outside diameter with wire gauge; boiler, fire-box, cross-heads, axles, piston rods and pins and rocker shafts all of steel.

The Morse Bridge Company, Youngstown, has received a large contract from the Pittsburg & Lake Erie railroad for bridge girders to be used on the Connellsville extension. The girders will cost $75,000, and it will require considerable time to complete the contract. The railroad company will construct their own bridges.

The Bartlett Iron and Steel Works, with a capital stock of $500,000, have decided to locate at Vermillion, and have secured a site east of the river, containing about sixty acres of land. The buildings when completed will be 60x1600 feet, and the company will give employment to several hundred men when in full operation.

The Canton Car Works now employ one-hundred men, and are busy on a large order for box and cattle cars for the Cleveland, Akron & Columbus railroad.

The Austin Flagstone Company, of Warren, is filling a $60,000 contract at Akron, and is also furnishing the paving stone for the street railway track in that city.

The Youngstown Car Works are running nearly to their full capacity, although the closing down of several branches of business has to some extent curtailed the orders for new cars.

The managers of the puddling mill at Allicanna, having signed the Pittsburg scale, have started up.

T. A. Watson & Co., Pomeroy, have signed the $6.25 ton scale, which is 25 cents over the Pittsburg scale, and have resumed work.

The Holt Manufacturing Company, Cleveland, manufacturers of Holt's new portable forge are kept busy filling orders. The forge is operated by a lever, and so constructed as to dispense with gearing, whilst it gives a strong and uniform draft.

The Hamilton works of Wm. Tod & Co., Youngstown, are working night and day to keep pace with orders in foundry and machine shop. The new addition to the works is being rapidly carried forward.

Booth, Miller & Co., Youngstown founders and machinists, are employing twenty mechanics.

Our Springfield correspondent writes: Messrs. Thomas, Ludlow & Rodgers, manufacturers of force feed grain drills and "Superior" brand of seeders, also of improved Buckeye and Champion cider mills &c., employ on an average 175 hands. Trade was excellent the past season and they look for business on a still larger scale. This firm was incorporated Jan. 27, 1873. Their general trade is throughout Pennsylvania, Maryland, Delaware and Western States.——At the Champion City Brass Foundry, of which Mr. John J. Fawcett is proprietor, are manufactured Babbitt metal and tinners' solders. These works were established in 1873. Mr. Fawcett employs nine hands and is about branching out in the manufacture of a full line of brass goods for steam engines and those required by railroad and gas companies. A very large business has been done the past season and prospects are flattering. The works continue to increase in reputation for the excellence of the goods turned out. These goods are sold principally in this section of the State, but the trade of the West will hereafter be cultivated.——Mr. W. F. Bauroth, employs nine hands at his foundry and machine shop, rear of 27 West Main street, where are manufactured pulleys, shafting and hangers. Trade is reported very good; it is both local and with surrounding towns. A general jobbing and repairing business is carried on. The works were established in 1874.

## CORRESPONDENCE.

PITTSBURG, JULY 14.—The strikers keep up a bold front, but though obtaining some comfort from the compromises made by certain mills, have evident misgivings as to the success of the present strike, which was undertaken in opposition to the advice of the President and some of the most intelligent members of their Union.

It is estimated that the strike has already cost $3,000,000 in various ways, and this with little prospect of the great body of the manufacturers yielding, for neither the price of iron nor the demand for it are such as to encourage production, especially in view of the fact that British iron is being offered below card rates.

The men are certainly getting a rest with $11 per week to the married and $9 per week to the unmarried; but it is not to be supposed that they do not chafe under the enforced idleness.

Most of the manufacturers have been making needed repairs; none seem in any haste to resume work. Some speculation has been excited as to the significance to be attached to the statement of President Jarret, at his last visit to Newburg, made to the strikers of the Cleveland Rolling Mills, that the strike in this city would soon be over. Some negotiations are understood to be going on between a few mill owners in the vicinity and the strikers, but this is weak ground on which to assert the collapse of the position taken by the manufacturers. Every one wishes well to the men, but all who view the situation calmly agree that this is no time in which wages can be prudently advanced. It would be otherwise could foreign competition be left out of the reckoning. Meanwhile prices of iron are stiffening, and should the strike continue there is no doubt that additional furnaces will blow out.

Several of the mills which have signed the scale are not running their puddling furnaces at all, so that the puddlers on whose behalf, with that of the scrappers, the strike was instituted, are not benefited at all.

## THE GLOBE IRON WORKS,

### CLEVELAND, OHIO.

The work of remodeling, improving, and extending among the iron manufacturers still goes on despite the many obstacles thrown against it by the "great strike." "Blood will tell," and so also will honest work win for itself a reputation and demand from those who require its products. In this regard we desire to call our readers' attention to the Globe Iron Works, of Cleveland, Ohio, which today are the largest works of their kind west of the Alleghenies. The company was established in 1853 for the purpose of vessel repairing and marine jobbing, etc. The honest effort, care, and completeness they exhibited in every iine of work entrusted to them spread their reputation, and the consequent demand upon them obliged them to add to their facilities, which they have enlarged upon from time to time, striving to accommodate the rapidly growing requirements of the trade. To more successfully accomplish this, having found their present quarters inadequate, they are now erecting a building which when finished will be one of the best, if not *the* best, machine shops for marine work in the West. This building, which is but a part of the works, will have a frontage on Elm street of 115 feet, and on Spruce street of 88 feet, and will take in a blacksmith shop 39x45 feet, a tool room 19x15 feet, and a machine shop 88x76 feet. The main building will be three stories high, and will be built in the most thorough and substantial manner. Some idea of this may be had from the fact that the joice on the first floor will be 8x3 palnking spaced 14 inches, while on the third floor they are 2x12 spaced 18 inches. The walls, which are of brick, are 16 inches thick with 24-inch philisters. The second floor will be supported by wooden columns 14x14. Everything is so arranged that in case of fire the wood work will not endanger the walls or impair their strength. When finished the building will have three stalls with a space of 37 feet, and will be fitted with traveling frames with a lateral range of 31 feet, and will be capable of lifting from 25 to 30 tons. The shops will be supplied with cranes for heavy lifting, which will be run by steam. An 8x8 double hoisting engine is now being built for this purpose. The company last year added an iron ship yard to their works, and are now able to furnish complete vessels of wood or iron of the largest dimensions. In connection with their marine work the company manufacture stationary, portable, blowing and hoisting engines, narrow gauge locomotives, rolling mill machinery, tanks, stills, coarse sheet iron work, and general castings. The company furnish employment to 300 men, and double this number during some parts of the season. The present members of the company are J. B. Cowle, J. F. Pankhurst, R. Wallace and H. D. Coffinberry. C. T. M.

OVERLOADING SAFETY VALVES.—The practice which prevails extensively of loading the safety of steam boilers below the proper limit is a most dangerous one, and cannot be too strongly condemned. Cases are very frequent where by this means old boilers, worn and thinned by corrosion, are regularly worked at a much higher pressure than they were originally intended for when new. There can be but one result of such a course, and that points unerringly toward disaster. The wear and tear of a boiler so overloaded and so overworked is vastly increased, so that little, if any, economy results from the practice. It is true that in times of great business prosperity, when every department of a manufacturer's establishment is driven to its utmost capacity, that the temptation to overwork a steam boiler is very strong; still the practice is, under any circumstances, wholly inexcusable. With most kinds of machinery the only result of overwork is simply the failure of the machinery and the consequent pecuniary loss; but with steam boilers the case is different. Here the damage in case of accident is not confined to the boiler itself, or even destruction of adjacent property, but human lives are most invariably sacrificed. We think every one will agree that under no circumstances is the imperilment of people's lives justifiable. Everything should be done that human knowledge renders possible to make use of steam perfectly safe.

### METAL ALLOYS.

In a recent work of "metal alloys," published in Germany, the author, Mr. Guetlied, gives the following suggestion on the subject of fusing metals: 1. the melting pot should be red hot—a white heat is better—and those metals first placed in it which require the most heat to fuse them. 2. Put the metals in the melting pot in strict order, following exactly the different fusing points from the highes degree of temperature required down to the lowest, in regular sequence, and being especially careful to refrain from adding the next metal until those already in the pot are completely melted. 3. When the metals fused together in the crucible require very different tempeaatures to melt them, a layer of charcoal should be placed upon them, or if there is much tin in the alloy, a layer of sand should be used. 4. The molton mass should be vigorously stirred with a stick, and, even while pouring it into another vessel, the stirring should not be relaxed. 5. Another hint is to use a little old alloy in making a new one, and the melting pots should be absolutely clean and free from any traces of former operations.

### FEEDING APPARATUS FOR STEAM BOILERS.

In supplying feed water to steam boilers, Mr. John Adams, of Watford, England, proposes to employ two feed or supply cisterns, one of which is open and placed above the boiler, and the other closed and adapted to resist considerable pressure. The open vessel is connected with the closed one, and the latter, in turn, with the boiler, by means of pipes, and when communication between the two last is shut off, the closed vessel may be readily filled, as required, from the open vessel. A pipe, issuing from the boiler to be fed, is provided with a three-way valve, or tap, and one of the passages connects the boiler with the closed feed chamber, while another runs from the latter to the open vessel. By means of this arrangememt steam may be admitted from the boiler to the closed vessel, and when communication is made between the bottom of the latter and the former, there will be a tendency to establish equilibrium, resulting in the feeding of the boiler. Steam may also be admitted from the closed chamber to the open one for the purpose of heating it before being used.

### A NEW WEATHER INDICATOR.

Considering that a fall of the barometer in general indicates coming rain only when the moisture increases at the same time, Herr Klinkerfues, of Gottingen, has devised a combination of the barometer and the hygrometer. The horizontal axes of a rotating index has two supports behind, and between these a short piece projecting in opposite direction to that of the index, which is more or less oblique. Over this piece passes a thin, soft cord of hygroscopic fibres, (e. g., of human hair deprived of greace), reaching from the outer support to the middle of the corrugated plate of an aneroid case. It will be understood that when the air-pressure increases, the cord is stretched and the index rises. But, if the moisture increases, the cord slackens and the index falls.

### NOVEL STOKING APPARATUS.

Messrs. William Miller & Co., of Glasgow, Scotland, are now manufacturing a new stoking apparatus, the principal of which is somewhat novel, and has the advantage of preventing smoke, effecting at the same time a graat saving in fuel, The machine as constructed for boilers is driven by steam power, and by a simple arrangement is self-acting, and requires little attention. It consists of a box placed on rails or pivots, and provided with a movable bottom. After the box is charged it is moved underneath the bars of the furnace, at the same time pushing along a movable part of the furnace bars. When directly underneath the aperture thus created, the action of the machine raises the green fuel into the fire, so that both the smoke and gas from the fresh material pass through the mass of red coal, and are consumed. So far from this dampening the fire, it rather increases the heat heat-producing power of the coal, and allows it to become coked. The withdrawal of the box brings back the movable portion of the furnace bars, and the fire thus made up is always red on the top, and maintains a uniform heat. The opening of the furnace doors is, moreover, rendered unnecessary, preventing the admission of cold air into the fire, and the work of the fireman is made more comfortable. The apparatus has also been applied to kitchen ranges, in which case the appliance is worked by hand. The fire is perfectly under control, and a bright, clear flame is at all times maintained. The saving of fuel is calculated to be about twenty per cent., in addition to the other advantages gained by the use of the apparatus.

### PRESERVATION OF WOOD.

The increasing cost of wood in this country has led to a great number of experiments in preserving from decay all kinds of wooden structures exposed to the weather. Among the more recent plans suggested is one for inpregnating wood with asphalt, combined with some antiseptic material. The finished wood, ready to be put together, is first submitted to heat to drive out the moisture, and is then placed in a hot bath composed chiefly of asphalt and corbolic acid. On cooling, the solvent of the asphalt evaporates, leaving a skin or coating of the asphalt on the surface of the wood that resists water and keeps the antiseptic material securely locked within the pores of the wood. The exterior of the wood presents a smooth, black surface that does not need to be painted.

### KABATH'S ACCUMULATORS.

Mr. Nicholas de Kabath, of Paris, has brought out an accumulator, which is designed to give a very large accumulating surface. It consists of a number of lead plates, connected alternately like the plates of a condenser. Each plate is composed of a set of strips of lead, 1-10th mm. thick. These slips are alternately flat and corrugated, and are placed so as to form a plate 8 or 9 cm. wide, built up of about 100 slips. They are kept together by a perforated lead plate, entirely surrounding them, but permitting a free circulation of the liquid. In forming a cell of the accumulator, Mr. De Kabath puts 12 of these plates into a water-tight wooden case having two terminals, and connects the alternate plates to the terminals. The end plates are plain sheets of lead, thus making 14 in all. The plates are fixed at top to the wooden cover, and rest at the bottom in a bed of black rosin and paraffine. The cells are charged with sulphuric acid, like M. Plante's secondary battery.

## ITEMS OF INTEREST.

GEORGE FAWCETT completed in April last his forty-seventh year of service in the English post-office as a rural messenger. From 1835 to 1842 he rode between Sedbergh and adjacent stations, carrying mails in this way a total distance of 67,160 miles. From 1842 to 1882 he has walked daily between Sedbergh and Dent, thus traversing 175,200 miles. His entire travels as postman foots up 242,360 miles, nearly ten times the distance round the earth, and 2,300 miles further than from the earth to the moon.

THE first experimental growth of Italian hemp in the United States has proved successful. The experiment was made by a planter near Natchitoches, La., and on examination of samples by experts at New Orleans it has been pronounced of so excellent a quality that if grown by practical hemp producers it will supersede the ordinary hemp of Missouri and Kentucky, and take the place of Russian hemp now used for ship cordage.

THE number of establishments for manufacturing chemicals in the United States is 1,349, and having an invested capital of $85,486,856, employing 29,500 persons, the total yearly wages paid being $11,820,728. The total value of materials used in the manufacture of chemicals is given in the census at $77,344,281, and the total value of all products is given at $117,407,054.

THE total annual production of sugar in the world is said to be 5,820,000 tons, of which the United States, or rather the State of Louisiana, produces only 125,000 tons.

AT Fort Keogh, M. T., an order has been issued that there shall not be sold more than 160 acres of Northern Pacific Railroad lands to any one person.

ENGLISH dealers in ice, are buying ice in Maine, and it sells in England for $9 a ton. About 300,000 tons will supply all England for the season, while New York City alone uses between 2,000,000 and 2,225,000 tons.

WELLS, FARGO & Co.'s express line takes in 27,000 miles, over which are scattered 10,000 agents.

OF the 30,000,000 acres of land in Mississippi less than 5,000,000 is under cultivation.

IT is estimated that the cotton worm destroys $15,000,000 of the cotton crop every year.

MASTER Car Builders' Association adopted a report recomending the substitution of iron for wood and steel for iron in car construction.

A BRILLIANT remark was that lately made by William H. Vanderbilt, now in the wild West, but late of Wall street, to the effect that it was "high time that the stock speculators who have been selling what they didn't have had reached the end of their string." He was inclined to think that they had got to the end.

PIG iron contains from ninety-five to ninety-seven parts of pure iron, and three to five of carbon, with small quantities of sulphur, phosphorus and silicon.

NOTWITHSTANDING England's indebtedness to her mechanics, but one workingman has ever been buried in Westminster Abbey; this was Graham, the clockmaker.

IN fifty years Chicago has emerged from a swamp to a city of 500,000 inhabitants. Boston, in the same time, has increased its population from 60,000 to 400,000; New York from 100,000 to nearly 2,000,000 if we include Brooklyn and Jersey City.

THE British tax on distilled spirits yields over $70,000,000 a year.

THE make of spiegeleisen in Great Britain amounts to nearly 100,000 tons per annum, of which the largest quantity is produced in South Wales.

THE German Government intends to attach architects and engineers of experience to their foreign embassies and legations, to report on new inventions, remarkable achievements, etc., that may come under their notice.

IT has been found out West that the willow affords excellent fuel, for it burns gradually, makes an intensely hot fire and long living coals. The general growth of the tree along farm lines and on the prairies is advised. The willow grows rapidly, is hardy, and the plant of one acre in a very few years would be fit for firewood, furnishing, by a rapid re-growth on the cuttings, a lasting supply.

BEDS of cannel coal have been discovered above Laredo, which are believed to be practically inexhaustible.

A NEW industry is reported as being developed in Texas, in the collection and utilizing of a gum considered fully equal to the gum arabic of commerce. It is the product of the Mesquito tree, which is said to closely resemble the acacia of the East, from which the imported gum is obtained, and is afforded in large and easily gathered quantities. Much of it was gathered last year and sold readily at 15 cents a pound.

GALVANIZED iron is iron covered with zinc in a zinc bath. Formerly it was covered by the aid of electricity, created by a galvanic battery, but lately it is covered with zinc in the same manner that tinned iron is made, still keeping its old name.

THE peppermint crop of the United States reaches about 70,000 pounds a year, of which 30,000 pounds are exported. Two-thirds of the peppermint oil of this country is produced in New York and about one-third in Michigan.

IN Germany sawdust is combined with glue, or other intensely adhesive material, to form a plastic mass from which are wrought door-knobs, piano keys, and a variety of objects.

### Wheels of Locomotives.

At the meeting of the Master Mechanics Association discussion was had on the question, "What is the maximum limit of weight to be allowed per wheel for locomotives?" The discussion brought forth a comparison between English and American locomotives, whereby it was shown in England, engines weighing 16,000 to 18,000 pounds per wheel were allowed, while in this country, the maximum weight allowed on some roads, the Erie for instance, was 13,000 pounds, on others only 8,000 pounds. From 10,000 to 11,000 pounds per wheel seemed to be considered the best weight by a majority of those present.

WELDING SPRINGS.—Some experience on this subject is furnished by a correspondent of the *Blacksmith and Wheelwright* writes: About seven years ago I was told by Mr. Frank Wright, of Waltham, Mass., to try pin or rivet a spring. I did so, and have employed that method ever since. If the end is split twice, and the pieces locked together, it is impossible to get a good solid weld, as it is necessary to weld the ends down, three on each side, and to weld the split lengthwise. Several years since I welded the main and second leaf of a $1\frac{3}{4}$ by 5-leaf spring under the hind end of a wagon that was calculated to carry from 1,200 to 1,700 pounds, three trips per week. I know that it was used for three years after the time I repaired it, and it never broke or settled. By riveting the pieces together I find I can weld seven out of every ten, and do the work so perfect that the line of weld cannot be discovered.

CORNISH CRUSHING ROLLS.—Among the specialties which have lately been introduced to the notice of English mine owners are the cornish crushing rolls and similar machinery, patented by Mr. Hall. The rolls are provided with side supports, which are firmly held together by rigid cross frames planed upon the upper sides, thus allowing the use of turning rests and tools with traversing motion across the faces of the rolls. The latter are provided with patent elastic spring connecting links, which can be so adjusted as to crush the ores to an even size, in place of massive levers and weights The crushers are fitted together by interlocking jaws, and are made in sections, no part weighing more than 300 pounds. Each section is complete in itself, and from the fact of their being made in right and left-hand pieces, cannot be placed in a wrong position. The working parts and frame are of the best cast steel, planed, with drilled holes, while wrought-iron bars at the top and bottom take the strain off the side frames, the patent elastic connecting-rods reducing the possibility of breaking to a minimum. The frames are strong, and at the same time light, while the speed of the machine is about 250 revolutions per minute.

### A Continuous Plate Mill.

—The idea of a continuous plate mill is something new, but an inventor of Pittsburg, Mr. Jacob Reese purposes to roll nail plate by very novel but economical method. He would cast hollow ingots having a length of thirty inches, a central opening twenty-six inches in diameter, and walls five inches (more or less) in thickness. The ingots will be taken from the molds while hot and placed in one end of a furnace 35 feet in length and 40 inches in width. This furnace declines about three feet from the charging end to the end from which the ingots are drawn. In front of the furnace and on the line with it, is a railway track connecting with the rolls. This track also declines toward the rolls. When an ingot is charged into the furnace, it rolls of its own gravity down to the on down to the outlet door, and in this manner the furnace may be filled. When the front ingot is hot it is drawn ont with a hook operated by machinery and placed on the railway, when it will roll like a barrel toward the rolls. When the ingots is withdrawn from the furnace all of the outer ingots roll over one half or one-halt of a revolution thus bringing the bottom side np, and as there will be eight ingots in the furnace, each ingot in the furnace, each ingot will be turned over from eight te sixteen times, according to the position of the stops provided to check them, without any manual labor for turning them; the object being to economize labor and secure a more uniform temperature.

OVERLOADING SAFETY VALVES.—The practice, which prevails extensively, of loading the safety-valves of steam boilers beyond the proper limit is a most dangerous one, and cannot be too strongly condemned. Cases are very frequent, where, by this means, old boilers, worn and thinned by corrosion, are regularly worked at a much higher pressure than they were originally intended for when new. There can be but one result of such a course, and that points unerringly toward disaster. The wear and tear of a boiler so overloaded and overworked is vastly increased, so that little, if any economy results from the practice. It is true that in times of great business prosperity, when every department of a manufacturer's establishment is driven to its utmost capacity, the temptation to overwork a steam boiler is very strong; still the practice is, under any circumstances, wholly inexcusable. With most kinds of machinery the only result of overwork is simply the failure of the machinery and the consequent pecuniary loss; but with steam boilers the case is different. Here the damage in case of accident is not confined to the boiler itself, or even destruction of adjacent property, but human lives are almost invariably sacrificed. We think every one will agree with us when we say under *no* circumstances is the imperilment of people's lives justifiable. Everything should be done that human knowledge renders possible to make the use of steam perfectly safe.

BLACKSMITH'S FAULTFINDING.—A correspondent of the *Blacksmith and Wheelwright* writes: Whenever a man brings his horse into the shop to be shod, the first thing the blacksmith will ask is, "who shod this horse the last time?" The man will answer, naming a certain smith. The prompt reply of the other is, "You simply paid that man for ruining your horse He don't know enough to shoe an old cow. He don't know a decent shoe when he sees it." The other smith will say the same thing of this man when he has the chance. Carriage smiths I fear are much of the same kind. Whenever one see's another's work he will soon have a little fault to find about that job. He will say that one brace is too long or another too short; that one brace is not heavy enough, or that it is heavier than necessary. Finally he will conclude that his brother smith cannot proportion a job at all; that all he really is fit for is to iron wheel barrows. My experience is that blacksmiths are for ever faultfinding about each others' work.

The railway through the Alps, under the St. Gothard Pass, which was recently inaugerated brings Italy into direct communication with Switzerland ang Germany. The tunnel is more than nine miles long, and the passage is aocompliched in twenty minutes.

KAOLIN is being used on the South Carolina railway with great success as a covering for boilers. It is mixed with plaster of Paris in the proportion of two parts of the former to one of the later, jute being mixed wich is destroyed by heat much more effectually than the ordinary wood legging, while the the the grvasy nature of kaolin preserves the iron from corrosin at the same time having no chemical action upon it.

A rool of zinc-coated iron neither wears out from oxidation nor crumbles as does sheet iron from the contractions and expansions produced by changes of temperature.

## PRACTICAL MECHANICS.

### BARREL MANUFACTURING.

The leading barrel manufacturing establishment of East Cambridge is devoted solely to the production of sugar barrels and with a branch concern in East Boston turns out 3,500 barrels a day on contract with the Bay State, Revere, and East Boston sugar refineries, and the Forest City of Portland. The staves are of elm from Ohio and Michigan, and are taken from dry kilns and fashioned at the bottom in an iron frame, by men working with both hands equally well, and whose dexterity may be judged from the fact that they handle 14,000 staves daily. The staves are now drawn together at the top by a machine windlass and an iron hoop applied to hold them in place. The barrel is then heated to the smoking point, so that it will retain its shape. It is then taken to an automatic machine which shaves the edges and grooves them for the heads. The coopers next hoop and head the barrel and it is ready for shipment. At a third establishment the same firm re-coopers old flour barrels for sugar houses, turning out about 500 per day. The buisness is now very good but the high prices of wood have reduced the margin on contracts considerably. Thus staves which were selling last year at $5.00 are now worth $6.75; heads that sold at $5.00 now being at $8.25, and hoops are worth $9.50 that sold for $7.75. This is attributed to bad weather in the lumber regions. Another concern manufacturing barrels produces 1,000 packages daily but of different kinds, largely for fish and pickle dealers for Boston market.

The stock of staves, heads and hoops in spruce and pine come from Maine and in ash and oak from Pennsylvania, and is ready for putting together without the use of machinery.

This concern is about to engage in the manufacture of mackerel kits, for which a full outfit of machinery will be secured. This branch of the business will be carried on in a new building 110x30 feet, two stories with the basement, which is just completed. Power will be furnished by an 18 horse power engine, and every means will be employed to handle with success this growin branc of the business.--*Boston Commercial Bulletin.*

### Wrought Iron Driving Wheels.

Some shops which have made a decided specialty of wrought-iron wheels for locomotives, have reduced the process of making them to a very perfect system. They employ for the first forming of the parts of the wheel the usual drop-forging method of working, so that when the welding required in closing up the wheel as a whole is reached, it is found to be the very least possible in amount, and of the plainest kind.

The arms are formed in dies, which give to the inner end of each piece a wedge-shaped outline, of such a taper that these several pieces, when laid snugly together, shall form a compact mass around the eye, or central hole, which is to be left for the axle. The outer end of each arm is upset so that it may be readily welded, in suitable hammer dies, to a flat bar or block, long enough on each side of the arm or wheel-spoke to reach to the corresponding piece on the next arm. Each end of this block thus put in a T shape to form the rim of the wheel is scarfed down so that in finishing the rim a V piece can be welded in on each side, thus joining the T end of the arms, and making a complete circle.

When the pieces have been made ready they are laid on a suitable bench-block and closely drawn together with a band around the outside of the rim. Thus, in a rough way, the whole outline of the wheel is complete before any of the parts are actually welded to each other. A thick circular plate is then laid on the inner ends of the arms to serve as the boss on the face of the wheel and a heat is taken on the whole central mass. A few blows under a suitable hammer then weld the whole hub. A heat is then taken on the parts of the rim between each wot arms, and the V pieces referred to are welded in solid, one at a time.

If the wheel requires an eye or boss for a crank-pin, as nearly all these locomotive wheels do, then the arms which must pass through this boss are formed with thickened places on them so as to fill up the outline of the crank-boss solid, and the facing plate or piece which is to form the front of the hub is made of an oval shape so that it may cover the whole area of the central boss and the crank pin eye besides.

The wedge-shaped enlargement of each arm is carefully worked up to the outline needed for strength and neatness, at the inner end where the arms touch each other, so that in the welding of the central body of the wheel the fillet outline is left so true and perfect as to need little or no cold-finishing afterward. The joining of each arm and its own piece of the rim. being made in a hammer die, is quite perfect after the few blows of the hammer have been given, and it usually receives no further attention except the painting. Care is obviously needed in heating and in welding the centre of the wheel, and in keeping the rim true to the circle, so that the turning off of the outside shall leave a uniform thickness at the rim. In some cases the inside of the rim between the spokes has been tool-finished on a slotting machine, cutting to a vertical curved outline, thus leaving the rim thicker in the middle of its width than at the edges, but the expense of this kind of finishing is rarely incurred.

Comparisons are sometimes made between the skillfulness of English workmen who do this class of work and their American fellow-blacksmiths, somewhat to the disadvantage of the latter, but there can be no reasonable doubt that when a real call exists for such wrought-iron wheels in this part of the world, there will be plenty of places where they can be had. It now looks as though the first substitute for the American cast-iron driving wheel would be a solid steel casting, which shall be made ready for the tire with less work than is now needed, and which shall be even lighter than the solid wrought wheel itself.

## MISCELLANEOUS.

TECHNICAL EDUCATION.—Technical education is of so much advantage from the national standpoint that its value to individuals is often lost sight of entirely. In many of the European countries skilled labor is fostered by the State in the same manner as are the public schools in the United States, and polytechnic buildings at Stuttgart and Munich cost 1,000,000 florins each, and the liberality of their endowment equals the splendor of their construction. France gives an annuity of $200,000 to three technical schools, and a grant of $400,000 a year to academies of higher art. The South Kensington Museum of Industrial Art has already cost the British Government $5,000,000, and the yearly appropriation for the encouragement of technical skill is $400,000. The time is not far distant when the Government of the United States will follow the example of these older and wiser nations, and there will be large sums annually appropriated by Congress for the maintenance of similar institutions. Much of the money that is now uselessly squandered in the annual river and harbor bill could be better expended in fostering schools of useful arts, and to promote the growth of the leading industries.

Ours is an industrious and inventive people. We are already far ahead of all other nations in manufacturing, labor-saving, agricultural and mechanical implements, but we are far behind other people in making the finer and more valuable class of silk, cotton, and other kinds of dress goods. Our immense importations of goods of all kinds from other countries, which would be manufactured here if we had the skilled labor, is only another evidence of our need of training schools which would educate the workmen to produce what we now purchase abroad. It will be a happy day for this country when neither American cotton and wool from the South and West, nor the crude ores from our silver and gold mines, will have to be transported 3,000 miles to be manufactured and converted into useful articles, and returned to us again at a great expense. The time will come when the Government will aid in the establishment and maintenance of polytechnic schools, where skilled artisans can be taught, and where all arts and industries will be properly protected from foreign intrusion.

COAL TRADE IN HOCKING VALLEY.—The coal trade of the valley is very active at present, and the C. H. V. and T. R. R. Co. is rapidly adding to its immense fortune amassed from the coal traffic of this region. This company, owning a continuous line of rail from Pomeroy to Toledo, with its various branches into the coal and iron fields, has become a mighty and powerful corporation—immensely wealthy. Its roads are of the best, its equipments are great and fine. It has had the whole business of the Hocking Valley entirely in its own hands for many years, undisturbed by competition from rival lines. It has got all it demanded for freight and travel, its rates in many instances being excessive and highly exorbitant. But its palmy days are fast fleeing by. The Baltimore and Ohio Company is reaching out a competing hand toward it. The Ohio Central road, its most prominent and direct competitor, is rapidly working towards a direct competing line, and has already commenced to hedge in the Hocking Valley coal fields, now tapped by this rich corporation.

HARDENING STEEL.—It is well known to workers in steel that by the process of hardening it is sometimes expanded, so that a job where two pieces fit accurately in their unhardened state become so much enlarged that grinding is necessary to restore them to their former relative size. No rule has yet been found by which the amount of this expansion can be actually determined before hardening. It may depend upon the amount of carbon in the steel, which varies in different specimens; on the degree of heat employed in the process; and also largely on the size and shape of the pieces treated. This expansion may, however, be reduced to the minimum by repeated annealings while the work is in progress at the lathe, vise or planer. It is also true that in some instances steel, having been hardened, will contract slightly when drawn to temper, the amount of contraction depending on the slowness of drawing.

MEASURING THE POWER OF BELTS.—The *Mechanical Engineer* mentions a simple, and, it thinks, effective device for measuring the power of driving belts, without going into any tedious dynamometric calculations. An ordinary two-part clamp, with a hook on one plate, is secured to the belt, and to the hook is attached a common spring balance such as icemen use. The other end of this is in turn fastened to the nearest wall or timber that will give a direct pull. The engine is then started, and the reading of the spring balance at the moment the belt slips is the actual resistance or tension of the pulley. This, multiplied by the speed of the belt per minute, gives the total foot pounds transmitted by it for the time reckoned. This will, it is thought, prove a very useful device for parties hiring power, as there cannot be any question of accuracy of calculation, any theories of width of belt per horse-power, or any error of any kind, because the actual dead pull of the particular belt in question under test, with all its perfections or imperfections, as they actually exist, is given.

THE OLD TIME MILLWRIGHT.—An English writer of a book on mechanical progress pays the following passing tribute to the old millwrights, whose distinctive occupation, like Othello's, has now well nigh gone. It was very truly remarked that the millwright of former days was to a great extent the sole representative of the mechanical art, and was looked upon as the authority in all the applications of wind and water, under whatever conditions they were to be used, as a motive power for the purpose of manufacture. He was the engineer of the district in which he lived—a kind of Jack-of-all-trades—who could with equal facility work at the lathe, the anvil, or the carpenter's bench. In country districts far removed from towns he had to exercise all these professions, and he thus gained the character of an ingenious, roving, rollicking blade, able to turn his hand to anything. He wandered from mill to mill in seach of work, and was everywhere recognized as an itinerant engineer and mechanic of high reputation. He could handle the ax, the hammer, and the plane with equal skill and precision. He could turn, bore, or forge with the ease and dispatch of one brought up to these trades, and he could set out and cut in the furrows of a millstone with an accuracy equal or superior to that of the miller himself. These various duties he was called upon to exercise, as in the practice of his profession he had mainly to depend upon his own resources. Generally he was a fair arithmetician, knew something of geometry, leveling, and mensuration, and in some cases possessed a very competent knowledge of practical mathematics. He could calculate the velocities, strength, and power of machines, could draw in plan and section, and could construct buildings, conduits, and water-courses in all the forms and under all the conditions required in his professional practice.

Getting Up Steam.—The following communication, lately received from a well-known dealer in machinery, is a very good illustration of one way to get up steam—and keep it after you have got it. We have a story too good to keep. A gentleman applied to us for a cheap boiler, one that would be good for two pounds or so. The only one we had had just been tested at 150 lbs. to the square inch, but that was too good. He said he once bought one for $30.00, and ordered a young man in his employ to get up steam in it. He went away and was gone longer than he expected, and on his return he found a raging fire in the furnace, a pot filled with bricks on the safety-valve lever, and a very much frightened young man hanging on to the same lever with all his weight, and both hands. The boy said in explanation, that he didn't know anything about a boiler, but he supposed that if he "let any steam get out of that thing on top, it would blow him and the shop to smithereens. Ah, said he, I'm glad ye came, for I couldn't howld it much longer." It evidently came near being another mysterious (?) explosion.

Our Cotton Manufactures.—The final computation of statistics of the cotton manufactures of the United States for 1880 have been completed by by the Census Bureau. Stated in round numbers, the total amount of capital employed is $208,000; 000; spindles, 10,600,000; looms, 227,000; operatives, 175,000; bales of cotton consumed, 1,470,-000; pounds of cotton consumed, 750,000,000; cost, $87,000,000; yards of cotton manufactured, 2,255,000,000; wages paid operatives, $42,000,000; value of production, $193,000,000; number of mills, 751, distributed as follows: Eastern States, 438; Middle States, 138; Southern States, 159; and Western States, 16; capital employed in Eastern States, in round numbers, $157,500,000; Middle States $30,000,000; Southern States, $17,000,000; Western States, $3,000,000. The average wages of operatives last year were $245 per annum.

Sawdust Fuel.—George F. Brott, of Louisiana, and Platt B. Walker, of Minneapolis, have undertaken to solve the sawdust problem by means of a process for utilizing sawdust as a portable fuel, for which they have secured a patent. The process consists simply in mixing the sawdust with peat, the latter forming a cohesive paste, which, when dry, results in a solid compound that cannot be easily fractured, and can be as easily transported as wood or coal. Mr. Brott is now superintending the construction at Philadelphia of the necessary machinery for the purpose.

### CAMBRIA IRON AND STEEL CO., PA.

The Cambria Iron and Steel Company, Johnstown, Pa., which has just purchased the immense interest in the Lake Superior Iron Mines, own 50,000 acres of lands in other places, some 23,914 acres in Cambria County alone. The main buildings of their plant, if set in a straight line would make a continuous building 3,346 feet long and varying from 30 to 160 feet in width, but averaging about seventy-five feet. This does not include the Gautier Steel Works, which cover nearly six acres, nor the Woodvale wooden mill, which has a frontage of 1,200 feet. The company, besides 500 ovens in the Connellsville region, have put up 120 ovens at Johnstown, and make their own coke. The company have thirteen blast furnaces, two of them producing 800 tons each of pig a week, a Bessemer plant, with two six and a half ton converters, and two open hearth Pernot furnaces, with a capacity of thirty-six tons each per day. The Bessemer steel is rolled into rails; that from Pernot furnaces goes to the Gautier Steel Works to be made into springs, wire and the finer articles. They have thirty-five miles of railway, employing ten large engines and ten little engines for yard service.

Their capacity is 990,000 tons of pig metal, coke, steel ingots, steel rails, puddle bars, iron rails, rail fastenings, and iron and steel in other shapes. To make this immense output they consume of iron ore (mined and purchased) 400,000 tons; coal (mined by the Cambria Iron Co.) 775,-000; limestone (mined by Cambria Iron Co.) 125,-000. Total consumption, 1,300,000.

Their pay rolls have on them a small army of almost 8,000 men. Although these are paid largely by orders on the company store, the cash paid out here by the company averages $120,000 a month throughout the year. The plant is valued at $7,000,000. The company have a capital stock of $3,000,000, and a surplus fund which is accumulating so fast that they scarcely know what to do with it.

### PRODUCTION OF AGRICULTURAL IMPLEMENTS.

The manufacture of agricultural implements has been the subject of government inquiry and census. The figures given show a remarkable increase. In the United States there are 1,842 establishments for the production of agricultural implements. Of these 231 are in Illinois, 265 in New York, 220 in Pennsylvania, 155 in Ohio, 133 in Michigan. The total capital employed is $62,315,966; worth of timber used, $5,791,916, worth of iron and steel, $18,424,052; worth of other material, $7,878,202; total, $32,094,107. The largest number of person employed during the year was 49,180. The total value of all products was $68,373,086. In 1850 the total product was $5,842,611. In 1860 it was $17,-487,060. In 1870, $52,066,875. During the year there were made 325,057 cultivators; 131,003 harrows; 280,655 dozen hoes; 112,147 dozen of shovels; 380,732 dozen hand rakes; 1,361,443 plows; 211,-738 dozen of hay forks; 1,244,264 scythes; 47,717 scythe snaths; mowers, 72,000; seed sowers, 20,289. In 1850, 7,220 persons were employed; in 1860, 14,814; in 1870, 25,249; in 1880, 49,180.

### BRAZIL.

There is no more productive or interesting country than Brazil on the globe, or one in which it is easier to obtain a livelihood. Some who have sailed up to the Amazon declare that a vessel can be loaded with Brazil nuts at an expense of only a few cents per bushel. These constitute a valuable article of commerce, while the oil extracted from them is very desireable. All the tropical fruits are produced in Brazil almost without cultivation. The soil in many parts of the country will produce twenty successive crops of cotton, tobacco or sugar-cane, without the application of manure. No country in the world approaches the land of Don Pedro in the variety of its forest productions. The late Professor Agassiz stated that he saw one hundred and seventeen different kinds of valuable woods that were cut from a piece of land not half a mile square. They represented almost every variety of color, and many of them were capable of receiving a high polish. One tree produces wax that is used for candles; another a pitch that is used for food; still another yields a juice which is used in the place of intoxicating liquors. There is a single variety of palm out of which are obtained food, drink, clothing, bedding, cordage, fishing tackle, medicine, harpoons, musical instrument material for dwellings and varioususeful and ornamental purposes.

### BOILER FIXTURES.

By P. Barnes, Springfield, Ill.

The really first-rate fireman of a battery of boilers ought to have snug fitting doors to his boiler fronts, both on the furnaces and on the ash pits. A large proportion of the larger boilers now used no doubt have such doors, but very many do not. The obvious result of a badly fitted fire door, or rather the real result which is not always obvious to the fireman or the owner, is that an enormous total volume of air is needlessly heated as it leaks through the crevices, and the furnace to the stack, the coal thus unnecessarily burned being as completely wasted as if a flow of sand were permitted to pass through the fire, and so absorb useful heat. It is a difficult thing to get men to see that more air may be very easily let into a boiler furnace than can possibly be consumed, but since it all must be heated that the coal needed to heat it is wholly wasted. In other words, the amount of heat absorbed by this useless flow of air is stolen or lost outright from the useful work that is done by the boiler. Another thing hard to be believed by men who have to do with such matters is that a very large amount of air does pass into a boiler furnace through crevices around doors which appear to be so trifling. If the air thus leaking had to be paid for, as do the leaks registered by a water meter, then the profitableness (or otherwise) of their continuance would be very speedily determined.

One of the mort useful appliances for promoting the ecomomy of a fireman's labor is the common butterfly damper, set at any convenient point in the main flue or in the stack. If this ha an auomatic steam pressure attachment so much the better but even a hand regulation is better than none ;especially if a real convenient fixture be applied so that a touch of the hand shall be sufficient to adjust it. Such a damper should also be so fitted that it can be shut down perfectly tight, for when a boiler needs to be checked or stoped for a time, however brief, the shutting of a tight damper is the quickest and most complete means of checking the fire, so far as the economy of coal is concerned. If to a good shaking grate, and a tight damper with closely fitting doors, there be added a good steam jet fixture for blowing dust and soot out of the boiler tubes, and also the lightest and best steel hand tools, then the boiler owner may rest assured that he has done nearly or quite his utmost to put his fireman in the way of doing himself the most complete credit that is possible.

### Underground Telegraph Wires.

The underground wire problem is about to be solved at Pittsburg, where they propose to lay a cable constructed under a new patent. It is made of corrugated lead, three quarters of an inch in diameter, with openings for wires which are to be about a third of the size of those commonly used for telegrapic purposes. These wires will be wound with fine cord saturated with a composition the nature of which is not revealed. The only objection which electricians have noted is the possible weakness of the insulating material. Another device consists of an iron box, two square feet, through which a hundred wires may be run in such a manner that each will be four inches away from its nearest neighbor. The whole contrivance may be used as a curbstone, or may be planted in the roadway between street car tracks. This affair will cost $2,500 per mile.

Paint for Iron Work.—The advice of Trautwine on paint for iron work, as on most others, is very safe to follow. He gives in his opinion that the best paints for preserving iron exposed to the weather are prepared from the pulverized oxides of iron, such as yellow and red iron ochers, or brown hematite iron ores, finely ground, and simply mixed with linseed oil and a dryer. White lead applied directly, he affirms, requires incessant renewal, and, indeed, probably exerts a corrosive effect. It may, however, be applied over the more durable colors where appearance requires it. Red lead is said to be very durable when pure. An instance is recorded of pump rods in a well 200 feet deep, near London, England, which having first been thus painted, were in use forty-five years, and at the expiration of that time, their weight was found to be precisely the same as when new, showing that rust had not affected them. When the size of the exposed iron admits of it, the same authority adds that its freedom from rusting may be promoted to a large extent by first heating it thoroughly, and then dipping it into, or washing it with, linseed oil, which will then penetrate into the interior of the iron. For tinned iron exposed to the weather on roofs, rain pipes, etc., Spanish brown is a very durable color. The tin is frequently found perfectly bright and protected where the color has been used, after an exposure of forty or fifty years. White paint washes off in a few years by the action of rain. In regard to the Barff and Bower processes for the purpose of preserving iron, which depend upon the formation of a thin, tenacious film of magnetic oxide upon the surface of the metal, we have no doubt but that they will very effectually protect the iron from corrosion. Whether or not they can be applied economically in practice, is a question that we are not at present prepared to answer. Both of these processes require a special paint to be worked on a large scale. We are inrmed that they are both in use in England, but with what practical success we do not know.—*Manufacturer and Builder.*

Green Timber.—Manufacturers out of the generosity of their hearts frequently of late construct furniture from wood freshly culled from the forests. This has led to the interesting discovery of a strong sympathy between the native and domesticated woods. With the changing seasons they manifest the same traits. A striking proof of this fact is narrated by *The Furniture Gazette*: "A well-known Chicago-merchant bought a chamber-suit on State street, and after some trouble with it related his experience thus: 'It was a first-class chamber-suit, and had more enterprise than any other articles of furniture I ever knew. It was winter when I bought it, and it behaved pretty well for a time, but along toward spring it began to get kind o' uneasy and restless like. I didn't know what was the matter with it until after an uncommonly warm spring day I went home, and I hope to die if the blasted thing hadn't broken all over with buds! The lumber was so green that it had sprouted, and in less than a week there was one of the prettiest little groves of waving walnut branches you would ever wish to see. It made a beautiful shade, and it was the best summer bedstead I ever knew.' "

## MINING ENGINEERING.

The product of the Custer mine, Idaho, for twenty days of June was $5,945 gold and 25,375 fine ounces silver.

From the Silver Cliff mine, Silver Cliff, Colorado, were shipped on the 28, ult., 300 pounds of silver, valued at about $9,000.

The richest carload of silver ore ever extracted in Tuscarora, was hoisted from the 250-foot level of the Navajo mine, Nevada, recently. Its weight was about 1,400 pounds and its estimated value over $2,000. Regular bullion shipments from this mine have commenced.

Philadelphia takes 2,250,000 tons of fuel for heat and steam annually. The Reading delivers a million tons of coal from mines on its line, and there is three-quarters of a million of Lehigh and Wyoming coal taken in by various routes Bituminous is at least half a million tons.

Coal is mined from great depths; thus the Adelbert shaft, in Bohemia, is 9,280 feet from bank to sump, and the bottom is 1,548 feet below the level of the sea. At Gilly in Belgium, are two shafts, 2,847 feet. One at Lugan, Saxony, is 2,953 feet deep. At Rosebridge Colliery, near Wigan, England, the winding shaft is 2,458 feet deep, and the cage is hoisted in 55 seconds.

The dispatches from Mexico, too, are reassuring as to immense deposits of oil which railways will make it profitable to work. A body of Boston Capitalists have secured a large tract of land near Tuscpan on the eastean shore of Mexico, for the purpose of oil mining. The cheapening of the product in the European markets which would result from the working of rich oil deposits in Mexico, would prove a most effective lever in weakening the menopoly of the Standard Oil Company.

China is in the possession of coal deposits which are a surprise to the Europeans. Coal was worked 2,200 years ago, at least. The anthracite basin of Southern Shan-se is so rich that an output of 300,000,000 tons per annum, would be available for 2,400 years. The annual product is now set down at 3,000,000 metric tons, of which 1,000,000 is anthracite. Further discoveries of anthracite coal are reported, in that country. The coal is stated to be the same as the best American anthracite that is taken to China. The supply would appear to be of great extent, and the new coal has shown itself superior to all other known varieties or smelting purposes.

The New York Mining Record says: Any increased placer product from the hydraulic placer mines in California in this year as compared with last is out of the question, inasmuch as the hydraulic enterprises of the largest class in that State have been enjoined from working, and these injunctions quite recently, were made perpetual except by the provision on the part of these companies, of means impounding and holding debris from getting into the rivers, which will involve costly works that will take time for their construction.

The mines of Ohio are of three kinds —drifts, shafts and slopes; and the commissioner estimates that by the wasteful system of mining—by pillar and room—mostly in vogue in Ohio, at least 40 per cent. of the coal is lost by being left in the mines after they have been worked over, in the shape of crushed and abandoned pillars. While the coal fields of Ohio are in no special danger of being worked out in any reasonable time, the commissioner deems it his duty to suggest that such wastefulness is undesiraable, and that much of the waste could be avoided by long-wall working.

The company owning the Copper Queen Arizona, smelted up to April 1, 17,651 tons of ore, which yielded 5,753,235 pounds of black copper, which refined to 96½ per cent. produced 5,251,871 pounds of refined copper, the value of which in New York was $1,020,859.62. The cost of operating, freight, etc., was $532,733.33, leaving net earnings of $488,126.30 for the year. The quantity of ore now estimated in sight is 66,227 tons. Their works at the mine consist of two water jacket furnaces, capable of smelting from eighty to ninety tons of ore daily. The present daily output averages from 22,-000 to 25,000 pounds of copper—not a bad showing for a single company.

The Grant Smelting Company are about to put up very extensive works at Denver, Colorado, and propose to bid for ores from all the mines at the West.

In the interesting article by Mr. Hazelton, published by us last week, reference was made to the commencement of mining operations in Ohio. As remarked by Mr. F. E. Sawyer, in his annual report on the coal trade. Coal mining in Ohio is yearly growing in magnitude, and the future of this State as a coal producer is bright beyond calculation. During the past year four new coal fields have been opened up, to wit: Coalton coal field of Jackson county, the Corning coal field of the Sunday Creek Valley, the Del Roy Mines of Carroll county, and the Wheeling creek coal field along the extension of the Cleveland, Tuscara. was Valley and Wheeling railroad. Mr. A. Roy, the State Inspector of Mines, asserts that should the times continue prosperous for some years to come, the increase in the coal production of Ohio will be simply marvelous, and he declares that the mining facilities are such that the output could be increased to 12,-000,000 tons.

The total receipts of coal at Cleveland from 1828 to 1852, amounted to 662,855 tons, having increased from 30 tons in 1828 to 137,926 tons in 1852; we have no details from that date until 1865, but the following will serve to show the growth of the trade:

| Year. | Tons. | Year. | Tons. |
|---|---|---|---|
| 1865 - | 465,550 | 1874 - | 1,215,353 |
| 1866 - | 583,407 | 1875 - | 1,414,121 |
| 1867 - | 668.026 | 1876 - | 1,250,531 |
| 1868 - | 759,104 | 1877 - | 1,363,345 |
| 1869 - | 922,757 | 1878 - | 1,310,838 |
| 1870 - | 904,600 | 1879 - | 1,576,807 |
| 1871 - | 1,65,940 | 1880 - | 1,750,000 |
| 1872 - | 1,348,160 | 1881 - | 2,150,000 |
| 1873 - | 1,599,212 | | |

The lake shipments of bituminous coal from Cleveland last year exceeded 700,-000 tons. This city more than maintains its position as a distributing center of coal to the West and Northwest; and so long as the yearly output of coal in Ohio continues to grow at its present pace there must be a still further increase in the tonnage from this city. Ashtabula and Black River cease to be rival candidates for the coal shipping business with Cleveland. All the railway lines of importance that are located or about to be located in the State of Ohio, make for Lake Erie as a point of vantage for the transaction of business, and there is no city that compares with the Forest City. The coal seams of the State of Ohio are numerous, of good size and near the surface. The mines can be opened with little expense, and inasmuch as the output has more than trebled during the last decade, what an immense tonnage will be done ten years hence at the same ratio, and as we have said, Cleveland is the shipping port.

A correspondent of the New York Mining and Engineering Journal, writing from Parral, Chihuahua, Mexico, on that country as a field for mining, observes: As the wages of native miners range from 50 cents to $1.50 per day, they offer no inducements to good American miners, whose employment here is substantially limited to the foremen required by American companies, necessarily a comparatively limited number. But the difficulties just mentioned, which render Mexico a poor country for prospectors and miners, make it the country for mining investors, possessed either individually or in companies of sufficient capital to work their mines, erect stampmills or furnaces, and conduct their busines systematically. Here they can buy well-opened mines of proved merit for less than prospect holes in the United States are held at. The cost of labor and supplies may be considered as only one-half of the average of the United States districts, while the silver bullion realizes better returns from the mints here than present New York and San Francisco prices. Titles here are perfectly secure, mining litigation, which is the curse of the United States, being almost unknown. The general and mining laws are admirable, and their administration has greatly improved within the past few years. Security to person and property is greater here than in any other Western mining district, while the excellent climate promotes health and vigor of mind. But investors must not come here expecting to find mines of solid silver dollars ready coined, whose only fault is the sheet of gold twenty feet above them. Such mines are as rare here as everywhere else. But if they will be content with either free-milling or smelting ores, averaging from 50 to 100 ounces silver per ton, let them come here by all means. Like all mining districts, there are here occasionally rich mines, yielding up in the thousands; but for regular business, the dependence must be on average-grade ore, from 50 ounces upward.

In his able report on the coal trade at home and abroad, Mr. Frederick E. Saward, editor of the Coal Trade Journal observes as to Cleveland; This city receives a fine and varied assortment of bituminous coal. A great many coal basins—in fact, nearly all the Ohio formation, as well, as most of the coals lying west of the Alleghany mountains, in Pennsylvania—here find a market and a distributing point for the West, Northwest, Eastern and Canada trade. The great number of vessels employed in the ore and lumber trade naturally seek coal as a back freight or for ballast, which enables Cleveland to place coal in distant ports, like Chicago, Milwaukee and on Lake Superior at merely nominal rates. The business has been developed within the last fifteen years, and taking the rapid growth of the manufacturing interest in the West, into consideration, it is safe to presume that the coal trade has not yet reached its ultimate proportions.

The coals of Ohio are all of the bituminous variety, and are known by various and general names, as block coal, gas coal, cannel coal, etc., and by many special names, as Mahoning Valley coal, Hocking Valley coal, Salinesville coal, etc., according to the localities from which they were drawn. The best furnace coal is the block coal of the Mahoning Valley; the best coke is made from the coals at Leetonia and Washingtonville, in Columbia County; the best house coal is found in Jackson county; the best gas coal, so far as recent tests would seem to indicate, is the Barnesville coal, of Belmont county. In the Mahoning Valley raw coal is used in the blast furnaces in the region, with a little Connellsville coke. In the Hocking Valley, raw coal is also used. In Jackson county, raw coal from two seams, the Jackson shaft coal, and the Welltson coal is used. At Leetonia, coke is used, partly native and partly Connellsville. At Stubenville, a mixture of coke and coal is used from the same seam—the shaft coal of the county. The Jefferson county coal is one of the most valuable in the State. Gas is made from the coals of the Mahoning Valley, the Hocking Valley, the Steubenville coal, the Ohio river coal at Bellaire and Pomeroy, and the Hanging Rock coal of Ironton.

The coal business of the United States, which commenced with an insignificant output from the bituminous beds of the Richmond, Va., basin and some of the Western Pennsylvania beds, cannot be said to have assumed the proportions of "trade" till the discovery and opening of the anthracite fields of Pennsylvania about one hundred years ago. And, for many years after their discovery, indeed not untill after 1822, when the Lehigh coals came to the seaboard by way of the Lehigh river and canal, and in 1829, when the Delaware & Hudson Canal Company commenced regular shipments from the Lackawana District of the Wyoming region, did the coal trade of the United States rise to the dignity of a national industry. The anthracite regions, being the nearest to the great centers of population and industry, and containing immense deposits of coal easily accessible for mining, were naturally, developed more rapidly than the earlier known bituminous fields, and, since their product went to market over but a few routes, and was all under the eye, as it were of intelligent business men, it alone was duly recorded, and soon became in general estimation, the measure of the coal trade of the entire country. The scattered bituminous fields, no one of which compared in importance with the anthracite basins, though steadily increasing their production, did so at a much slower rate than their more advantageously located hard-coal rivals, and it has only been by the gradual western movement of the center of population that the immense deposits of bituminous coal have at last overtaken and exceded in production the small though rich deposits of anthracite in Eastern Pennsylvania.

The letter of the special corresponden

of the New York Mining Record from Bozeman, near the Mammoth Hot Springs Yellowstone river, remarks; The Upper Yellowstone Country is already famous for its many wonders and magnificent scenery, but heretofore, little, if any attention has been called to its gold mines. which are of sufficient value to excite the interest of mining men and insure a speedy and caretul examination of the whole section by the indefatigable prospector. In the mining districts of Crevice and Sheep Eater the only facilities for reducing the ores consist of an arastra having a capacity of 1,500 pounds of ore daily; but a small portion of the richer ores are reduced, the remainder being stacked up until such time as better facilities are obtained. In the latter district in one incline twenty tons of assorted ore yielded a trifle over $1,000. Scattered through the ore are small quantities of soft brittle rock which is very rich in gold. To ascertain its value a miner last summer filled a yeast powder can with the substance, reduced in a mortar and panned out $19. On the Germania locations, several inclines have been run in on narrow seams that are evdently shoots from a main lead not yet discovered. The property has been developed without plan or system, each of its several owners working on his own incline and changing his plan of operations frequently, but the ore is very rich. In 1879 two and a half tons yielded $2,400 and in the following year, four tons produced $1,325. Last year a considerable quantity of high grade ore was taken out, but none of it reduced.

## *BOOK NOTICES.*

*Art Amateur for July.* Devoted to art in the household. Edited by MONTAGUE MARKS. New York, 23 Union Square.

This is a most superb number, replete with exquisite illustrations in its general departments. A charming frontispiece consists of an array of pictures in the Paris Saloon of 1662. The "Note Book" is replete with what is going on in art. The Gallery Studio presents valuable contributions from Mr. William Astor's collection. Further on we meet with facsimilies of representatives of the several French army corps. Ceremics are superbly treated. Then follows Decoration of Furniture, abounding with suggestive hints. Art in dress will command every lady reader's attention; the illiustrations are precisely described. Art needlework is skillfully dealt with. A supplement of four pages with plates of designs for plaque and panel decoration, also for embroidery.

*Engineers' and Mechanics' Pocket Book.* Forty-first edition. Revised and enlarged by CHAS. H. HASWELL. New York. Harper Brothers, Franklin Square.

As a text book of reference for engineers and mechanics in completeness in respect to furnishing essential details of information of acquired experience in all that the various branches of practical science with which they have to deal. Its value for ready experience in estimates to be made as to the strength and quality of materials will be appreciated by all users. In these pages are explained the modes of making the multiform calculations relating to mecnanics and subsidary branches. Serviceable technical instruction is furnished as to the proper dimensions of mills and other constructions with reference to the service required. Due space is given to steam and the steam engine, the text including carefully collated tables and all the means of correct calculation. An important section is devoted to the mensuration of surfaces and solids. Very complete information is afforded as to limes and mortars, cements etc., of value to every builder as well as dealer in these materials. On hydraulics. hydronamics and dynamics, the work is at once scientific and practical. The works include tables of gravities, squares, cubes, roots, etc., measures, latitude and longitude, means of estimating strength of cables and anchors. It would be impossible within the compass of a review to summarize its contents. All workers in metals all engaged in constrnctive works will be enabled to put it to account. This Pocket Book has long been a recognized standard work. Each successive issue has shown an advance. Mr. Haswell, who is eminently competent to edit it, has done his work well. It is printed in clear type on fine but strong paper, and may be readily carried on the person so as to be available for immediate reference. It should have its place in every manufactory and workshop.

## INDUSTRIAL SCIENCE.

### Tool Steel and its Treatment.

In the American manufacture of tool steel the blister steel is melted up with a certain quality of wrought and cast iron and cast into ingots, which are subsequently forged into bars of steel, the proportions of blister steel to iron being such as will give to the finished product the required percentage of carbon. Thus the base of the steel may not improperly be considered as iron of which it is mainly composed, and the product may be considered as wrought iron, containing a certain percentage of carbon, which is called steel merely as a more concise and distinctive appellation. It follows then that there may be as many different qualities of steel as there are kinds of wrought iron, because the iron does not, in receiving the percentage of carbon, ENTIRELY lose its own identity, but carries with it into the steel its properties of toughness, etc., although such qualities may be modified by the percentage of carbon it has received.

It is obvious, then, that steel may be made for any specific that will answer the requirements more perfectly than can be done by using one quality of steel for purposes having different requirements, even though the percentage of carbon may be the same. Thus for a spring and strength and elasticity are the general requirements; while for a cutting edge, elasticity and strength may or may not be a permanent requirement—a razor, for example requires to be susceptible of a fine edge, and strength is of less importance than in the case of an axe. Again a metal cutting tool may require great strength, while its degree of toughness may be of little importance. Thus a shear or blade for cutting thin sheets of metal, tin or Russia sheet iron, would not require the toughness of one to be used for shearing heavy angle iron or boiler plates. Steel manufactures have from a long experience determined what is the best kind of iron or mixture of iron to convert into steel for particular purposes, and have made special steel for those purposes.

The influence of the kind of iron used to make the steel follows the steel throughout every phase of its treatment. Thus the forging, if done under the proper conditions, refines the steel as it would the iron; and, in general, the only modifications necessary to the treatment of the steel (from that of treating the iron) may be said to be that the steel cannot, without injury be subjected to so high a heat, and if maintained at a given temperature for a long time the steel would deteriorate more rapidly than the iron would under the same conditions.

The degree to which a piece of steel may be heated depends upon the quantity of forging it is to receive. Thus if a bar was to be drawn down from 4 to 3 inches square it could be heated higher than it could be without being damaged, if it were to be forged from 2 inches down to 1¾ inches square. The reason for this is that in proportion as the steel is heated it passes into a crystalline state, which becomes most plainly visible to the eye when steel is burnt, and bright crystalls which distinguish burning appear. But the forging if sufficient for the heat, rectifies this, providing that the crystallization or burning has not proceeded too far, and that the amount of forging has been sufficient for the purpose. Obviously, then, the heat of the steel should be varied according to the amount of forging. In forging the blows should be delivered as rapidly as possible, and heaviest at first, while the steel is softened all the effects of the blow can penetrate the mass and act upon it more uniformly throughout without a tendency to strain its particles. From what there has been said it will be obivious that to obtain the best results for any given purpose the manufacturer should be informed of the purpose for which the steel is to be used, so that he may furnish what his extended experience has taught him is the best for the required purpose. This, however, simply lays what may be termed a proper foundation, and it will still be left to the blacksmith to preserve this foundation throughout all the manipulations, and this subject will be treated hereafter.

## MARKETS.

### FINANCIAL.

Office of TRADE REVIEW AND WESTERN MACHINIST.

FRIDAY EVENING, July 14.

There is a fair borrowing demand. Discount rates are 7@8 per cent.; time paper is offered at 6 per cent; call loans are negotiated at 5 per cent.

NEW YORK.—Money has ruled easy. Call loans have been generally made at 2½ per cent.; commercial paper of the best class passes at 4½@5 per cent. The stock market has shown increased buoyancy and activity. The stability of the advance of prices depends upon the character of the coming crop and the extent of the foreign demand for our grain. There is a large flow of currency to the country. Upwards of $6,000,000 has been borrowed for western grain and provision speculation.

### IRON.

The market continues strong with a moderate business. Holders are firm and indisposed to make concessions. We quote: Foundry No. 1 X, $25; Foundry No. 2 X, $23; Gray Forge $22. Small parcels of Scotch Pig have been sold at full figures. We quote: Eglington, $23; Carnbroe and Glengarnock, $24.50@25; Coltness, $26.50@$27.00; Gartsherrie $26.50; and Langloan, $25.50@$26.00. More inquiry for steel rails is reported and a number of sales, mostly of small lots, have been made. Quotations continue at $47.50 per ton at mill for next fall and winter delivery, up to $50 for immediate orders. At these prices the market is active and steady. There is quite a demand for light rails, which are quoted at $51.50 to $53. For iron rails there is a fair demand, and sales are reported at $44 to $49 per ton at mill, according to section, etc. Old rails are very dull. Scrap is unchanged. An active demand continues for plate and tank iron. Spikes are steady at $2 90 to $3 per 100 lbs.; fish-plates $2.40 to $2.50; track-bolts, $3.50 to $3.60 for square head and $4 to $4.10 for hexagon heads and nuts.

CINCINNATI--(Reported by Rogers, Brown & Co.) The pig iron market has been steady and firm through the week. The demand is good, and of the sales made a few have been at improved figures. It would perhaps not be too much to say that the strengthening of values throughout the list will average fifty cents per ton. One offer for a round lot of No. 1 mill iron, Tennessee brand at $21, cash at Cincinnati, was promptly refused. It is doubtful if an order for good Southern No. 1 mill of any size or for any delivery, could be placed to-day for less than $21.50 cash. Among foundries the demand is steady for present supplies, and there is some contracting ahead for future wants. Several sales of No. 2 Southern coke have been made averaging the equal of $22.75 cash. at Cincinnati. Hanging Rock charcoal iron is in less active demand, owing to the steady advance of Southern coke and charcoal kinds in this market. A slightly better feeling in car wheel irons is noticed, though there cannot be said to be any demand yet. We quote for four months: Hot Blast Foundry—Hanging Rock CC. No 1, $27.00@$28.00; No. 2, $26.00@$27.00; Southern, No. 1, $25.00@@27.00; Strong Coke, No. 1, $24.00@25.00; No. 2, $23.00@$24.00; No. 3, $22.00@$23.00; soft Stone coal No. 1, $23.00@24.00; No. 2, $21.00@$22.50. Forge--Strong, Neutral, No. 1, Mill, $21.00@$22.50; Cold Short, No 1 Mill. $20.00@21.00. Car Wheel and Malleable--Hanging Rock Cold Blast, $33@34; Hanging Rock Warm Blast, $27@29; Southern Car Wheel Iron $34@36; Lake Superior do. $31@33; Lake Superior Malleable, $31@$33.

CINCINNATI—(Reported by E. L. Harper & Co.)—The market has been fairly active during the week. Consumers appreciating the fact that prices are ruling low, are supplying themselves with freedom, and some anticipating an early advance are booking liberal orders. There is no marked change in the aspect of the market since last report beyond a hardening of prices. The real value of pig iron will be developed on the cessation of the conflict existing between the mill proprietors and the hands. When even moderate orders from the many reserving will aggregate a demand the limited stock will be found inadequate to supply.

### COPPER.

Sales of Lake Ingot have taken place at 18¼@18¼c, and of "Anchor" Brand and Baltimore at 17⅝@17@17¾c. There is an improvement in price of the Best Selected owing to the large demand for copper of the highest grades for electric purposes, a demand that tends to increase. The prospect improves of an increased supply of Chili Copper. Advices from England show the position of copper to be firm in the London market. Best Selected is quoted at £74 10s, and Chili bars at £67 10s. No change has taken place in manufacturer's prices. We quote Bottoms 31c@32c; Braziers, 30c @36c; Circles, 33c@36c; Sheathing, 28c, and Bolt Copper, 30c; Segment Sheets, 33c; Fire-box ditto, 30c.

### LEAD.

A moderate business has been done. For Common Pig holders ask 4.95 to 5 cents, according to brand and quantity, the market ruling in sellers' favor. There has been no disposition to trade in large parcels, but a round lot could not be placed at these figures. Refined nominally quoted 5 cents. At St. Louis lead is scarce and firm, and commands $4.62½@4.65; Hard is worth there $4.65@4.60. Proprietors of Western smelting concerns consider prospects good for the firm maintenance of rates. There is no change in manufactured goods, and we continue to quote: Pipe, 7½c; Sheet 8c; Tin-lined Pipe, 15c; and Block, 45c; all less 10 per cent. to the trade. London prices are English Common Pig £14 5s.@ £14 7s. 6d.

### TIN AND TIN PLATES.

The Egyptian trouble has created a feverishnessness in the London tin market, as British merchants are dependent for their supplies from the East on the Suez route. This feeling has reached on this side the Atlantic, but a further upward movement has taken place, with a large business transacted at 22 3-4 up to 23 cents. for futures and up to 23 1-2 cents for spot lots in a jobbing way. The market closed yesterday strong and buoyant, with no sellers under 23¼ cents, spot, some asking 24, while for futures 23 3-8 to 23 1-2 cents was demanded. London was last cabled £101, spot steady, with a good demand. Singapore $32 per picul, Exchange 3s. 9⅞d. We quote for round lots Banca 28 cents; Straits and Malacca 23 1-2 to 23 5-8; Billiton 23 3-4; Australian 23 1-2; English L & F., 24 1-2; English Refined, none here. Tin Plates have been very quiet, at unaltered figures. We quote toward the close, large lots, ordinary brands, per box: Charcoal Bright, $5.90@6.25; ditto Ternes, $5.35@5.50. Coke Tin, $5.25@5 30, and ditto Ternes, $5.12½@$5.25. Liverpool cables Coke Tin 16s., and charcoal 18s.@20s.

### SPELTER AND ZINC.

There has been little doing in Spelter, either in foreign or domestic, and the market has ruled dull and to some extent nominal. Western brands held at about 5 5-8 cents, and Silesian obtainable at 5¼ to 5 60 cents, although inferior remelted stuff can be bought for less. Domestic and Foreign Sheet Zinc is in moderate jobbing request, the former being held at 7 3-8 cents, and the latter at 7 1-4 cents. The labor troubles have checked activity in the galvanizing branch. Sheet Zinc is steady at 7¼c@7¾c.

### ANTIMONY.

There is a brisk jobbing demand, but prices are depressed. We quote Cooks on 13¼@13¾c; Hallett 11c.

### COAL.

There have been considerable arrivals of coal, and shipments continue on a fair scale. Local prices are unchanged.

### HARDWARE.

Business on the whole has been satisfactory. The requirements for mechanics' tools is met with difficulty. Nails are fairly active. The tone of the market continues strong, and stocks are light. We quote 10d. to 60d., $3.40 per keg, net, but in a small way an advance of 10c. per keg is asked. For brass foundry work, such as taps, sash fasteners, door bells and hooks, there is a good inquiry. For wrought hinges the demand is fair. Stocks of brass and copper wire are being largely drawn upon. At a meeting of the manufacturers of Wood Screws, held in Providence, R. I., on the 28th ultimo, it was decided to make no changes in prices or terms. The Clothes Wringers Manufacturer's Association have made an advance of $3 per dozen on Clothes Wringers, owing to the continued high price of rubber, and the increased cost of other materials. Existing prices for wrenches having been confirmed; the New York agents of L. Coes & Co continue to quote Coe's "Genuine" at 40 and 10 per cent. discount from list. "Mechanics" Wrenches made by L. Coes & Co., and similar quality by A. G. Coes & Co. will continue to rate at 10 per cent. less than the "Genuine." A special discount of 10 per cent. will be allowed on specified orders for 50 dozen, for immediate shipment. Terms, 90 days, or 3 per cent. discount for cash in 10 days. Parties having purchased the quantity will be entitled to the extra discount on subsequent orders during balance of season ending December 31st, 1882.

### LUMBER.

There have been moderate arrivals. The more desirable classes of stock continue firm, whilst there is some yielding on large lots in general demand. Yard dealers look to increasing orders, and judging by last year's experience, even the kinds of which our yards are best supplied are not likely to have any superabundance by the Fall. There is an improved demand for hard woods, greater activity than ever existing in building. Finishing woods are in especial request. The available supplies of walnut are larger than had been calculated on, but prices continue to be well sustained.

### WOOL.

Sales have been large, and prices, as a rule, continue steady in the Eastern markets. There has been some reaction in the West, causing a disposition to press sales Sales at Boston and New York have taken place at the following prices. Ohio XX and above, 41@42c; X and above 40@45c; No. 1 at 45c; No. 2 at 37@38c; below at 35c; coarse 30@32c. The following are dealers' buying prices in this State: Coarse clothing and combing, 25@30c; medium, 35@37c, fine, 33@35c.

## LUMBER.

PLANK, MIXED WIDTHS.

2 inch, 12, 14 and 16 feet, together.

| | |
|---|---|
| A 1 and 2 uppers | $50 |
| A 3 | 40 |
| B | 32 |
| C | 22 |
| D | 15 |
| E | 13 |

1¼ and 1½ inch.

| | |
|---|---|
| A 1 and 2 uppers | $48 |
| A 3 | 40 |
| B select | 32 |
| C | 21 |
| D | 15 |
| E | 13 |

BOARDS.
One Inch, mixed widths.

| | |
|---|---|
| A 1 and 2 uppers | $44 |
| A 3 | 36 |
| B select | 30 |
| C | 19 |
| D | 16 |
| E | 13 |

STOCK BOARDS.
12 Inches wide.

| | |
|---|---|
| A 1 and 2 uppers | $45 |
| A 3 | 38 |
| B | 32 |
| C | 21 |
| D | 16 |

STRIPS.
6 Inches wide.

| | |
|---|---|
| A 1, 2, and 3 | $42 |
| B | 32 |
| C | 22 |
| D | 16 |
| E | 13 |
| Norway Fencing Strips | 17 |
| Norway Flooring Strips | 25 |

WORKED LUMBER
FLOORING.

| | |
|---|---|
| Flooring—A 3 | $42 |
| B | 38 |
| C | 24 |
| D | 20 |
| Norway Flooring—A 3 | 28 |
| C | 22 |
| D | 18 |
| Matched Drop Siding, 6 inches—A 3 | 42 |
| B | 38 |
| C | 24 |
| D | 20 |
| Beaded Ceiling $2 higher than Flooring. | |
| One half inch Bevel Siding—A 1 and 2 | 24 |
| A 3 | 20 |
| B | 18 |
| Ash Flooring—A 1 and 2 | 40 |

BILL STUFF.

| | |
|---|---|
| Small, joists, 12, 14 and 16 feet | $15 |
| Timber, larger than 8x8 special. | |
| Timber, longer than 18 feet, adds about $1 per foot per M. extra. | |
| Cedar Posts, large | 30 00 |
| " " medium | 25 00 |
| " " small | $15 to 20 00 |

SHINGLES, LATH AND MILL WORK

| | |
|---|---|
| Shingles XXX | $4 50 |
| Clear Butts | 3 25 |
| Lath | 3 00 |

Surfacing, one side, adds $1.25; two sides $1.50
Matching, flooring and drop sidings, $2.50.

## AN EXTRAORDINARY OFFER.

There are a number of persons out of employment in every county—yet energetic men willing to work do not need to be. Those willing to work can make from $100 to $500 a month clear, working for us in a pleasant and permanent business. The amount our agents make varies,—some making as high as $500 a month, while others as low as $100, all depending on the energy of the agent. We have an article of great merit. It should be sold to every House-owner, and pays over 100 per cent. profit. Each sale is from $3.50 to $10.00. One agent in Pennsylvania sold 32 in two days, and cleared $64.00. An agent in New York made $45.00 in one day. Any man with energy enough to work a full day, and will do this during the year, can make from $2,000 to $6,000 a year. We only want one man in each county, and to him will give the exclusive sale as long as he continues to work faithfully for us. There is no competition, and nothing like our invention made. Parties having from $200 to $1,000 to invest, can obtain a General Agency for ten counties or a State. Any one can make an investment of from $25 to $1,000 without the least risk of loss, as our Circulars will show that those investing $25 can, after a 30 days' trial, return the goods unsold to us and get their money back, if they do not clear at least $100. They show that a General Agent who will take ten counties and invest $216, can, after a trial of 90 days, return all goods unsold to us, and have money returned to them if they fail to clear at least $750 in that time. We are not paying salaries, but want men willing to work and obtain as their pay the profits of their energy. Men not willing to work on our terms will not work on any. THOSE MEANING BUSINESS will receive our large descriptive circular, and extraordinary offer by enclosing a three-cent stamp, with their address. The first to comply with our terms will secure the county or counties they may wish to work.

Address,

RENNER MANUFACTURING CO.,
118 Smithfield Street,
Pittsburgh, Pa.

## LAKE FREIGHTS.

COAL.

| | |
|---|---|
| Buffalo to Chicago | $.62½@.65 |
| Toledo to Chicago | 1.00 |
| Cleveland to Chicago | 70@75 |
| Erie to Chicago | 70@75 |
| Oswego to Chicago | 1.50 |
| Fairhaven to Chicago | 1.30 |
| Buffalo to Millwaukee | 70@75 |
| Cleveland to " | 70@75 |
| Erie to Milwaukee | 75 |
| Buffalo to Racine | 80 |
| Buffalo to Kenosha | 85 |

IRON ORE.

| | |
|---|---|
| Marquette to Lake Erie ports | 1.25 |
| Escanaba to Lake Erie ports | 90@95 |
| Escanaba to Chicago | 90@95 |
| Marquette to Chicago | 1.15@1.20 |

L. P. SMITH. JAMES OLWELL.
**SMITH & OLWELL,**
General Machinists,
Manufacturers of
**STEAM ENGINES.**
(STATIONARY AND MARINE,)
and Machinery of all descriptions.
116 Elm Street, Cleveland, O.
☞ Special attention given to Marine jobbing.

| | Mail. | Fast Line. | Accom. | Night Expr'ss. |
|---|---|---|---|---|
| Leave Cleveland | 8 50 am | 2 30 pm | 3 45 pm | 11 40 pm |
| Arrive Hudson | 10 00 | 3 28 | 4 50 | 12 50 am |
| Ravenna | 10 40 | 3 53 | 5 50 | 1 18 |
| Alliance | 11 25 | 4 25 | 6 05 pm | 2 05 |
| N. Philadel | 11 35 pm | 7 15 | ..... | 10 55 |
| Salem | 12 25 | ..... | ..... | 3 02 |
| Canton | 12 28 | 5 47 | ..... | 3 20 |
| Massillon via Alliance | 12 50 | 6 06 | ..... | 3 38 |
| Akron | 10 42 am | 4 10 | 5 40 pm | ..... |
| Pittsburgh | 3 30 pm | 7 45 | ..... | 6 55 |
| Wheeling | 5 10 | 8 00 | ..... | 8 55 |
| Marietta | 8 45 | ..... | ..... | ..... |
| Harrisburg | ..... | 4 15 am | ..... | 4 00 pm |
| Philadelphia | ..... | 7 50 | ..... | 7 35 |
| New York | ..... | 11 15 | ..... | 10 35 |
| Baltimore | ..... | 7 55 | ..... | 7 20 |
| Washington | ..... | 9 17 | ..... | 8 47 |
| Boston | ..... | 8 00 pm | ..... | ..... |

**Ravenna Accommodation** leaves Cleveland at 5:30 p m, reaching Ravenna at 7:15 p m; Akron 7:23 p m.

**Newburgh Accommodations** leave Cleveland at 11:00 a m and 12:30 pm. Returning, leave Newburgh at 11:10 am and 1:30 pm.

Passengers for New York, Philadelphia, Baltimore, Washington, and all points east of Pittsburgh make but one change of cars, viz. at Union Depot, Pittsburgh, excepting those leaving on the Fast Line which has Pullman Sleepers from Cleveland to Philadelphia and New York.

The Fast Line leaving at 2:30 P. M. has elegant Pullman Palace Sleeping Cars through from Cleveland to New York without change. Pittsburgh Passengers who desire Parlor Car accommodations can secure seats in this car.

The Night Express has Pullman Sleeping Cars from Cleveland to Pittsburgh which can be occupied by passengers at Union Depot, Cleveland, any time after 9:00 P. M. At Pittsburgh passengers can take elegant through Parlor or Sleeping Cars for the East.

Sleeping and Parlor Car accommodations from Cleveland and Pittsburgh eastward can be secured at the Union Sleeping and Parlor Car Office Union Passenger Depot; of H. C. Marshall, Union Ticket Office, Weddell House; or of the Ticket Agent at the Euclid Avenue Station.

Through tickets can also be secured at the same points. Baggage checked through from the Union Depot or from Euclid Avenue Station,

By the 8:50 A. M. train a through car leaves daily for Akron, Gambier, Mt. Vernon, Columbus and immediate points, without change.

The 2:30 P. M. train has through car for Akron, Orrville, Columbus and immediate points, arriving in Columbus at 9:25 P. M.

By the 3:45 P. M. Accommodation train cars run through without change from Cleveland to Cuyahoga Falls, Akron and Millersburgh,

Night Express leaving Cleveland at 11:40 P. M., runs daily, and makes connection at Wellsville for Steubenville, Bridgeport, Wheeling, Bellaire and intermediate points. Every night in the week except Saturday the night express runs via Wellsville. On Saturday nights it runs via Alliance. All other trains run daily except Sunday.

**Trains arrive at Cleveland.**—Night Express at 6:30 P. M., having Pullman Sleeper from Pittsburgh; Ravenna Accommodation, 8:35 A. M., Alliance Accommodation, 10:15 A. M.; New York Wheeling & Washington Mail, with Pullman Sleeping Car from New York and Philadelphia, 1:45 P. M.; New York, Philadelphia & Wheeling Express, 6:55 P. M.

WM. A. BALDWIN, General Manager. E. A. FORD, Gen'l Pass. & Tkt. Agt. Pittsburgh, Pa.

C. L. KIMBALL, District Passenger Agent, corner Bank and St. Clair streets, Cleveland.

## COLORADO EXCURSION RATES.

The Pennsylvania Company and Pittsburgh, Cincinnati & St. Louis Railway Company will, on July 15th, make a sweeping reduction in Excursion Rates from all Stations on their lines to Denver and return. Sale of tickets will continue till September 25th, 1882. The National Mining Exposition, which will represent all the resources, industries and attractions of the Rocky Mountain region, will open at Denver, August 1st. Drop a postal to E. A. Ford, General Passenger Agent, and ask him to send you pamphlet giving routes and Rates of Fare, they are furnished free of charge.

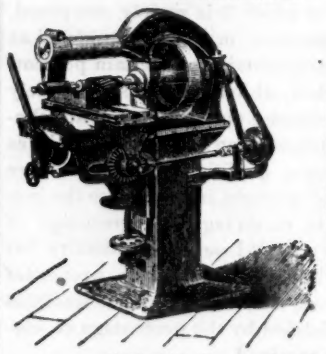
Crowl's Patent Iron
**Roofing,**
For Steep or Flat Roofs.
NO MORE NOISE OR LEAKING.
TIN AND SLATE ALSO FURNISHED.
Agents wanted in every County.
Cambridge Roofing Co.
Cambridge, Ohio. J. E. ANNIS, Sec'

**Cleveland to New York**
In Pullman Cars, via
Cleveland & Pittsburgh and Pennsylvania RAILROAD.

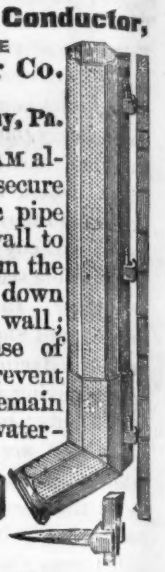
ON and after Sunday, June 4, 1882, trains leave Cleveland and arrive at the points named below as follows; (Night Express runs daily, all other trains daily except Sundays.)

B. F. Roberts,
**BOILER MAKER,**
And Sheet Iron Worker.
BRIDGE STREET, SPRINGFIELD, OHIO
Special attention paid to taking out and Piecing Portable Flues.
☞ Orders by mail to B. F. Roberts, Springfield, Ohio, promptly attended to.

E. F. ENSIGN,
JOBBER OF
**Agricultural Implements,**
WAGONS, FERTILIZERS, SEEDS, &C.
The Empire Grain and Fertilizer Drill and Twine Binding Harvesters Specialties.
134 ST CLAIR STREET, CLEVELAND, O

E. E. GARVIN & CO.
Manufacturers of

Milling Machines, Drill Presses
Hand Lathes, Tapping Machines, Cutter Grinders and Wood Planers. Milling Cutters, all shapes and sizes. Gear Cutting and Milling in all its branches.
Send for Illustrated Catalogue.
139-143 Center Street,
Cornell's Building. NEW YORK.

**Smith & Curtiss,**
JOBBERS OF
**TEAS,**
COFFEES AND SPICES
ALSO PROPRIETORS OF THE
CLEVELAND
Coffee and Spice Mills,
107 & 109 Bank Street,
Cleveland, O.

*The IRWIN & REBER*
PATENT
Expanding Water Conductor,
MANUFACTURED BY THE
S. S. S. Conductor Co.
LIMITED,
47 Federal St., Allegheny, Pa.

THE STANDING SEAM allows of an easy and secure fastening, keeping the pipe far enough from the wall to make any overflow from the eave pipe or head, run down the spout, and not the wall; and will open, in case of freezing, so as to prevent bursting, and still remain double-locked and water-tight.

PRINCIPAL AGENTS.
E. B. Badger & Son, Boston, Mass.; Noyes & Wines, New York; J. S. Thorn, Philadelphia; John G. Hetzell, Baltimore, Md.; R. P. Gormully, Chicago; F. Schmidt & Sons, Milwaukee; Shackelton Bros., Cleveland; Patterson & Hayes, Erie, Pa.; G. H. Peters & Son, Buffalo, N. N.; James Ackroyd, Albany, N. Y.; Witt & Brown, Cincinnati,; Hull & Cozzens' Mnfg Co., St. Louis, Mo., and many others.

FRONT RANK
Double Top Vapor Stove
Patented Dec. 13, 1881.

This Stove is acknowledged to be superior to all other Vapor Stoves.
AGENTS WANTED. Send for Illustrated Circular and Price List. Address
AMERICAN VAPOR STOVE CO.,
6 Champlain Street, next to Valley RR. Depot,
CLEVELAND, O.

E. Fawcett. R. B. Fawcett.
E. FAWCETT & SON,

Proprietors of
ALLIANCE INDUSTRIAL WORKS,
Manufacturers of
STEAM ENGINES,
and Circular Saw Mills.
Specialty of Portable Saw Mills and High Speed Engines.
ALLIANCE, OHIO.

JOSEPH M. DOWNING.
UNION TUBE WORKS, NEWCASTLE, PA.
MANUFACTURER OF
LAP WELDED BOILER TUBES
FROM BEST AMERICAN
Charcoal Hammered Iron.

# Cleveland Wholesale Prices.

## HARDWARE.

### Adzes.

Carpenter's ..... per doz $18 40
Ship ..... " " 18 75
Heavy railroad ... " " 19 50

### Axes.

Hunt's ..... ℔ doz $ 9 50
Lippincott's Crown ℔ doz 9 00
Cut More ℔ doz 9 00
Peck's Double Bit ℔ doz 22 00
" Champion Blade ℔ doz 11 00

### Anvils.

Eagle, Amer... per lb. 10c dis 20
Wright's 10¾c@11c
Armitage's Mouse Hole 9¾@9¾c
Trenton 10¾c
Wilkinson's 10½c

### Anvil Vise and Drill.

Millers Falls Co. $28 dis 20
Chency Anvil and Vise dis 25&2

### Vises.

Solid Box, list of July 1, '79, dis 35
Solid "Crown" (A. H. Hildick) 40 to 100 lb. 15c net
Solid, Peter Wright's ..... 15½
Solid, Wilkinson's 13½
Parallel, Parker's ..... dis 0
Saw Filers, Hopkins' ℔ doz $17.50, dis 10
Reading ..... dis 45&10
Cowell Hand Vises ..... dis 20
Richardson's Vise and Anvil ..... dis 25

### Augurs and Bits Dis.

C S cut augurs ..... 40&10
do do do bits ..... 40&10
D C gimlet do Ives ... dis 50
Snells bits ..... dis 40
Russell Jennings' augers dis 16⅔ &10&10
Cook's pat augur ..... 40&10

### Animal Pokers.

Berea, per doz ..... 4 00
Eagle, per doz ..... 5 00

### Apple Parers.

Domestic & Reading ℔ doz. $7 50
Turn Table ..... 5 00

### Bolts.

Machine ..... dis 60
Bolt ends ..... dis 60
Plow ..... dis 50
Plow, R. B. & W ..... dis 40
Cast Iron Barrel Shutter, etc ..... dis 50&10
Cast Iron Chain (Sargent' list) ..... dis 60&10
Ives' Pat. Door Bolts.. dis 50
Wrought Barrel ..... dis 55&10
Wrought Square ..... dis 55&10
Wr'g't Shut'r, all iron, Stanley's list ..... dis 50&10
Union Carriage ..... dis 70
Tire, R. B. & W., new list ..... dis 70&10
Stove, American Screw Co.'s ..... dis 40

### Bellows. Dis

Blacksmith's com new list, 45 ℔ ct
Moulder's new list, dis 25 ℔ cent
Hand, new list, 25 per cent

### Butts. Dis

Wrought brass ..... 65&10
Cast, loose joint ..... 10&10
Pin, japanned and silver tipped ..... 45&10
Wrought, fast joint narrow ..... 40&10
Wrought fast joint broad ..... 40&10
Wrought loose joint broad ..... 45&10
Wrought table and back flaps ..... 40&10
Loose joint, reversible . 45&10

### Cleveland Stamped Elbows

Genuine Russia Iron

4 inch per doz ..... 4 50
4½ do do ..... 5 50
5 do do ..... 7 50
5½ do do ..... 8 50
6 do do ..... 9 50
7 do do ..... 11 00

Planished American Russia Iron

4 inch, per doz ..... 4 00
4½ do do ..... 5 00
5 do do ..... 6 50
5½ do do ..... 7 50
6 do do ..... 8 50
7 do do ..... 9 50

Charcoal Iron

4 inch, per doz ..... 2 00
4½ do do ..... 2 50
5 do do ..... 3 50
5½ do do ..... 4 00
6 do do ..... 4 50
7 do do ..... 5 50
25 per cent

### Chisels.

Hot and cold cutting ..... ℔ lb 30
Railroad track ..... 30
Machinists ..... 30
Mallet head ..... 50
Cape ..... 50
Packing ..... 50
Stone cutters ..... 50

### Crowbars.

Cast steel ..... ℔ lb 8¼
Iron, steel points ..... 6¼c

### Cutlery, Pocket and Table.

Meriden Cutlery Co., table.. net
Am. Miller Bros.' Cutlery Co ..... dis 25
Humason & Beckley, pocket 33⅓
Naugatuck Cutlery Co... list net
Aaron Berkenshaw's pocket dis 25

### Crucibles.

Per number ..... 4@ 4¼

### Chains.

Coil by cask,

| 3-16 | ¼ | 5-16 | ⅜ | 7-16 | ½ |
|---|---|---|---|---|---|
| 10½ | 9 | 8 | 7 | 6⅝ | 6¼ |

### Drills and Drill Stocks.

Blacksmiths', each... $2.50 dis 10
Blacksmiths', self-feeding, each 7.50 dis 20
Breast, P. S. & W ..... dis 20&10

### Drawing Knives.

Witherby's ..... dis 65@10
Nobles Mfgr. Co ..... 15
Adjustable handle ..... 20

### Emery and Emery Paper.

Regular Numbers ..... ℔ lb 6c
Flour and F. F ..... ℔ lb 4c
B. & A. Emery Paper.. dis 30&5

### Enameled and Tinned Ware.

Kettles ..... dis 50
Sauce Pans ..... dis 25
Tinned Sauce Pans ..... dis 50

### Files.

Auburn... $5 to £. dis 35 pr cent
E. M. Boynton's, new list dis 25
J. & Riley Carr ..... 4.50 to £
Johnson & Bro. ..... dis 30
Butcher's ..... 4.50 to £.
Walter Spencer & Co.'s "Diamond" ..... 4.50 to £.
Fisher's ..... 4.75 to £.
Moss & Gamble ..... 4.50 to £.
H. Disston & Sons (new list) ..... dis 40 per cent
Heller Bros.' Horse Rasps ..... dis 25
Nicholson ..... dis 40
New American ..... dis 40
Union File Co ..... dis 40

### Grindstones.

Ohio ..... 1¼@1⅞ ℔ lb
Nova Scotia ..... 1¼@1⅝ ℔ lb

### Hammers.

Maydole's ..... dis 15
Cheney's ..... dis 25
Hartford Hammer Co ..... dis 20
Humason & Beckley. ..... dis 50
Verree ..... dis 5
Magnetic Tack, Nos. 1, 2, 3, $1.25, $1.10 and $1.75, dis 25&10
Nelson Tool Works ... dis 40&10
Warner & Noble's ..... dis 5
Kip's ..... dis 15
Yerkes & Plumb ..... dis 15
Wilkinson's Smiths' 11½c ℔ net

### Hatchets.

Yerkes & Plumb:--Shingling, Nos ... 1, 2, 3,
℔ doz $7 50, $8 00, $8 50, dis 25
Claw, Nos ..... 1, 2, 3,
℔ doz $8 25, $8 75, $9 25, dis 25
Lathing, Nos ..... 1, 2, 3,
℔ doz $7 50, $8 00, $8 50, dis 25

### Nails.

10 to 60d ..... 3 50
8 and 9d ..... 25
6 and 7d ..... 50
4 and 5d ..... 75
3d ..... 1 50
2d ..... 2 75
3d fine ..... 3 00
2d fine ..... 3 75
⅞ inch ..... 3 00
4d barrel ..... 1 00
1¼ inch barrel nails ..... 1 50
1⅛ do do do ..... 1 75
1 do do do ..... 2 50
⅞ do do do ..... 3 00
Cut spikes, all sizes ..... 25
Clinch nails, all sizes ..... 1 75
Casing and box nails 75 cts advance
Finishing nails, $1 25 do
Tobacco nails, 50 cts do

### Nuts and Washers

Nuts, square ..... 7c off list.
Nuts, hexagon.. ..... 7c. off list.
Washers ..... 6c off list.

### Picks.

Railroad, 4 to 5 lbs... doz $7 75
5 to 6 lbs... 7 75
to 7 lbs... 8 50
7 to 8 lbs... 9 50
Railroad Tamping Pick .... 7 to 8 lbs.. doz 13 50
Mill Picks per lb ..... 75c

### Rivets.

Iron ..... dis 40
Tinned ..... dis 40
Copper ..... dis 33⅓

### Squares. Dis

Steel or iron, case lots ..... 50
Try squares and T bevels ..... 40

### Spikes—WROUGHT

All lengths by ¼ inch ..... 4½c
do do do 5-16 ..... 3½
do do do ⅜, 7-16 & ½ in 3¼

### Shovels and Spades.

Ames' new list, July 1, 1881, ..... dis 15
Old Colony ..... dis 15
Remington's (Lowman's Patent) ..... dis 30
Rowland's ..... dis 40 and 10
Griffiths ..... dis 40&10

### Saw Sets.

Boynton s patent X Cut, per doz $12; Hand Saw, per doz $10. ..... dis 20
Stillman's Genuine, per doz $3 50 and $5 50 ..... dis 20
Stillman's Imitation, per doz $3 25 ..... dis 20&10
Common Lever, per doz $2 ..... dis 30&10
Leach's No. 0 $8; No. 1 $15; ..... dis 15
Hammer, Hotchkiss $5 50, dis 10
" Bemis & Call Co.'s new patent ..... dis 40&5
Bemis & Call Co.'s Lever and Spring Hammer .dis 30&5
Bemis & Call Co.'s Plate . dis 10
" " Cross-cut dis 12½
Aiken's Genuine... $13, dis 50&10
" Imitation ..... $7, dis 50
Hart's Patent Lever ..... dis 20
Disston's Circular ..... dis 40

### Sad Irons.

From 4 to 10 lbs.... per lb 3¾ net
Self-Heating ..... ℔ doz $9 net
" Tailors.. ℔ doz $18 net
Gleason's Shield and Toilet ..... dis 25
Mrs. Pott's Irons, double pointed ..... dis 35
Mrs. Pott's Irons, square back ..... dis 35
Enterprise Star Irons .... dis 40
Combined Fluter and Sad Iron ..... ℔ doz $15, dis 15

### Scales.

Hatch, Counter, No. 171..
℔ doz. $42, dis 37½&10
Union Platform ..... $6, dis 45
Fairbanks' ..... dis 20
Buffalo Scale Co ..... dis 20&5
Forsyth Scale Co ..... dis 25
Howe's ..... dis 20&10
Chatlilon's Eureka ..... dis 25
Family Universal ..... dis 50
Scale Beams ..... dis 33⅓&10

### Bag Holders.

Sprengle's Pat, $18.00 per doz 40 per cent. dis.

### Planes.

Ohio Tool Co ..... dis 25
Sc ota ..... dis 3
Bailey's Pat. Adjstble. dis 20@25

### Rules.

Stanley ..... dis 66⅔ and 10

### Sash Locks. Discount.

Payson Mnfg. Co. "Perfect" .42
Simmons' Sash Supporters . . 20

### Hinges.

Champion double acting spring hinges ..... dis. 30
Screw & Strap 8@12 in. ..... $6. net
Gravity Locking Blind Hinges, Sargeant & Co. 70&10

### Screws. Dis

Flat head iron or steel per cent dis.. 30
Flat head brass ..... 30
Round head iron or steel.. 25
Round head brass ..... 20
Brass and Silver capped .. 40
Japanned, list of Plain Screws..... 20
Coach, patent Gimlet point, list per 100 ..... 60
Lag, taper points ..... 60
Bed ..... 10
Machine, flat head, iron .. 55
round head, iron 50
Bench, iron ..... 55&10
wood, beech, per doz $3 ..... 10
wood, hickory ..... 20&10

### Valves. Dis.

Jenkins' Patent Gate Valves..35
" " Globe " ..40
" Standard Packing " ..20

### Wrenches.

Coe's genuine ..... 40 & 10
Coe's imitation wrought bar ..0
Mechanics' ..... 60 and 10

### Wire.

Brass and Copper ..... dis 20
Bright & annealed, Nos. 0 @ 18 dis 50@52½
" " Nos. 19 @ 26 dis 60
" " Nos. 27 @ 36 dis 65
Coppered ..... Nos. 0 @ 18, dis 45
Galvanized, Nos. 0 @ 18, market list, ..... dis 40@45
Tinned, Nos. 0 @ 18, ..... dis 40@45
Cast steel ..... dis 40
Tinned Broom Wire, Nos. 18 @ 25 ..... dis 55
Annealed Fence, Nos. 8 and 9 ..... dis 55@52½
Annealed Grape, Nos. 10 to 14. ..... dis 52½
Galvanized Telegraph, Nos. 7 to 9 ..... ℔ lb 7¼c
Galvanized Telegraph, Nos. 10 to 11 ..... ℔ lb 8¼c
Galvanized Telegraph, No 12 ..... ℔ lb 10¾c
Fence staples ..... ℔ lb 5½@5¾c
Fence Staples, galvanized, ℔ lb 7@7¼c
Stubs Steel Wire ..... $7 00 to £
Barb Wire, painted ..... 8¼c
Barb Wire, galvanized ..... 9¼c
Crucible Steel Ropes from ¾ in. at 9c to 1¼ in. at ..... 52c
Best Selected Iron Ropes from 3-16 in. at 8c. to 1¼ in. at ..... 33c

### Boiler Plates.

("Gaylord"--Standard Quality.)
C. No. 1 ..... 4 50
C H. No. 1 Sheil ..... 4 75
C. H. No. 1, 50,000 ..... 5 25
C. H. No. 1, 55,000 ..... 5 75
C. H. No. 1 Flange ..... 6 50
Firebox ..... 6 50
T. S., 60,000 ..... (as per) .6 50
T. S., 65,000 ..... (act of) .
Homo. Steel, 70,000 (of Cong) .7 50
Heads, ¾c ℔ lb. extra.
N.B.—Eastern brands of boiler plate at from 2-10 to 3-10c ℔ lb less than above prices.

### Sheet and Tank Rivets. "Norway."

All sizes ..... dis. 15

### Boiler Rivets—" Albany."

⅛, ¾, 11-16, and ¼ in. diam .5 50

### Boiler Makers' Tools.

Doty's Power Shears .... net list
" Hand Lever Shears net list
" Power Punch ..... net list
" Hand Punch ..... net list
Steel Screw Punch ..... net list
Iron Screw Punch ..... net list
Boiler Plate Rolls ..... net list
Buffalo Forges & Blowers dis 20
Watson's " " net list
Spring Tube Expander .... dis 15
Roller Tube Expander .. net list
National Tube Cleaner .... dis 20
Wire Flue Brushes ..... net list
Anvils—"PeterWright" 12½ ℔ lb
Solid Box Vises ..... net list

### Nuts, Bolts, etc.

Square & Hex. Nuts .. 6¾ off list
Washers ..... 6¼ off list
Machine Bolts ..... dis 60
Bolt Ends ..... dis 60
Boiler Patch Bolts ..... net list

### Boiler Tubes.

"National" Standard Gauge 1 inch to 10 inch ..... dis 37½
"National" Standard Gauge 11 inch to 15 inch ..... dis 25
"National" Special Locomotive Tubes ..... net list

## IRON AND STEEL.

### Flat Bar.

1½ to 4 by ⅜ to 1 inch ..... 2 85
4¼ to 6 by ⅜ to 1 inch ..... 3 00
1¾ to 6 by 1⅛ to 1½ inch... 3 25
1¼ &1¾ by ⅜ to ¾ ..... 3 00
1 & 1¼ by ⅜ to ¾ ..... 3 10
⅝ ¾ and ⅞ by ⅜ to ¾ ..... 3 25

### Round,

1 to 1⅞ inch ..... 2 85
2 to 2⅜ ..... 3 15
2⅝ to 3¼ ..... 3 45
3⅜ to 4 ..... 3 50
4¼ to 4½ ..... 3 45
4¾ to 5 ..... 4 90

### Square.

1 to 1⅞ inch ..... 2 85
2 to 2⅜ ..... 3 10
2⅝ to 3¼ ..... 3 45
3⅜ to 4 ..... 4 00
⅝ to ⅞ ..... 3 00

### Heavy Band.

1¼ to 6 by ¼ and 5-16 inch. 3 10
1 to 1⅜ by ¼ and 5-16 do 3 15
⅝ to ⅞ by ¼ and 5-16 do 3 50
⅝ to ⅛ by ¼ and 5-16 do 3 10

### Half Oval and Half Round.

Wagon box iron ¼ and ⅜ .. 4 80
1-10c per lb extra will be charged for cutting to specified lengths

### Light Band.

1¼ to 6 by ⅛ to 3-16..... 3 50

### Hoops.

1¼ to 2 , Nos 16 to 18..... 3 90
1¼ to 4 do 13 to 15..... 3 60
1-10 extra for each gauge lighter

### Sheet Iron.

No 22 to 24..... 5 60
No 25 to 26..... 5 85
No 27..... 6 10
No 28..... 6 60

### English Steel.

Best cast..... ℔ lb 15½c
Extra cast..... 16½c
Round machinery, cast 15c
Swaged, cast..... 18c
Best double shear..... 15½c
Blister, 1st quality..... 13c
Refined tool steel..... 16½c
Spring calking..... 7½@7¾c
German steel, best..... 11c
2d quality..... 10c
3d quality..... 9c
Sheet cast steel, 1st quality..... 15½c
2d quality..... 14½c
3d quality..... 12½c

### American Steel.

Best brands of refined cast steel, ¾ to 2 inches....12c
Crucible cast..... 7c
Open-hearth ditto ..... 5c
Hammer cast steel ..... 9c
Spring cast steel..... 7½c
Bessemer and open-hearth spring..... 5c
Ditto plow..... 4½c
Steel boiler plate ..... 6½@7c
Bessemer machinery... 5 @6c
Spring and calking ..... 7½@7½c
Tire ..... 5
Sleigh shoe..... 5

### Bessemer Steel Tire.

¾ to 1 by 9-32..... 4½ ℔ lb
¾ to 1 by ⅛ to 5-32 ..... 4½ ℔ lb
¾ to 1 by 5-16 to ⅝ ..... 4½ ℔ lb

### Miscellaneous Cast Steel.

Auger and auger bit..... 1
Axle steel for wagons..... 7
Frog points and plates..... 8
Frog size bars ..... 8½
Pick, plain ..... 90
Mattock, beveled ..... 9
Table cutlery ..... 8½
Trap spring steel..... 9
Pike and cant hook..... 9
Coal and granite ..... 8½

## TINNER'S STOCK.

### Tin.

Banca, .....per lb. 28@28c
Straits ..... " 24@25c
English ..... " 24@25c
Bar ..... " 27c

### Tin Plate.

IC 12x12 charcoal ..... $ 6 50
IC 14x20 do .....6 25@6 50
IX 14x20 do ..... 8 25
DC 12½x17 do ..... 6 00
DX 12½x17 do ..... 8 00
DXX, 12½x17 do ..... 10 00
DXXX, 12½x17 do..... 12 00
IC, 20x28 do ..... 14 50
IX, 20x28 do ..... 18 50
IC, 14x20, Best Roof..... 6 00
IX, 14x20, do ..... 8 00
IC, 20x28 do ..... 13 00
IX, 20x28 do ..... 14 50
IC, 10x14 Best Coke..... 5 75

### Solder.

Half and Half, in bars.....15
No. 1 do .....14½
Spelter Solder..... 25

### Pat Planished Sheet Iron.

[A] ..... per lb 10½c
[B] ..... 9½c

| Nos | 10 | 15 | 21 | 25 |
|---|---|---|---|---|
| | to 14 | 20 | 24 & 26 | |
| Com | 3-60 | 3-80 | 4-00 | 4-20 |
| Char | 5-60 | 5-60 | 6-00 | 6-20 |

Sheets over 28 in. wide ¼c extra

### Zinc.

Sheet, cask..... 7¼@ 7¾
Sheet, open..... 8@ 8½

### Tinners' Tools & Machines.

Machines (P. S. & W.) list add 20
Tools (P. S. & W.) ..... add 6

### Gas and Steam Fitters' and Machinists' Supplies.

Gas and Steam Pipe.....dis 60.
Enameled Pipe ..... dis 65
Artesian Well Casing....net list
Hydraulic Tubes ..... net list
Malleable Iron Fittings..net list
Cast Iron Fittings ..... dis. 35
Globe Valves..... dis. 35
Angle Valves..... dis. 35
Check Valves..... dis. 45
Safety Valves..... dis. 35
Eddy Gate Valves ..... dis. 20
Steam Cocks ..... dis. 35
Service Cocks ..... dis. 35
Ball Gauge Cocks (net per dozen) ..... $15
Compression Gauge Cocks dis. 35
Miss. Gauge Cocks ..... dis. 35
Register Gauge Cocks (net per dozen) ..... $15
Cylinder Cocks..... dis. 30
Air Cocks (net per dozen) ..$2 75
Oil Cups..... dis. 30
Steam Gauges..... dis. 30
Water Gauges ..... dis. 45
Scotch Glass Tubes ..... dis. 60
Steam Whistles ..... dis. 35
Iron Body Globe Valves.. dis. 35
Iron Body Safety Valves.. dis. 35
Iron Body Steam Cocks .. dis. 35
Pipe Tools ..... special
Globe, Angle and Check Valves (Star's regrinding) ..... dis. 25
Mack's Injectors ..... dis. 25

### Babbitt Metal.

No. 1..... ℔ lb 16
" 2..... " 14
" 3..... " 10
" 4..... " 8

## LEAD.

American, ℔ lb..... 5½c
Bar, ℔ lb..... 6½c net
Pipe, ℔ lb 7½c dis 10 per ct
Sheet, ℔ lb.. 8c dis 10 per ct
Tin-lined pipe ℔ lb 15c dis 10 pr ct
Shot Drop 7c; Buck.... 8c
Chilled Shot..... 8c

## COPPER.

Lake Ingot..... 18⅛@18¼c
Baltimore ..... 17⅝@17¾c
Arizona ..... 18c
Sheathing Braziers Copper, Bolts, &c.
Brazier's Copper, ordinary sizes, 16 oz. per sq. foot, and over per lb. ..... 30c
Brazier's Copper, ordinary sizes, under 16 oz. and over 12 oz. per sq foot, per lb. 32c
Brazier's Copper, 10 oz. and 12 oz per sq. ft.. per lb. 34c
Brazier's Copper lighter than 10 oz. per sq ft.. per lb. 36c
Circles less than 84 inches in diameter .. per lb. 33c
Circles 84 inches in diameter and over ..... per lb. 30c
Segment and Pattern sheets per lb. 33c
Locomotive Fire Box sheets per lb. 30c
Sheathing Copper, over 12 oz. per sq. ft ....per lb. 28c
Bolt Copper ..... per lb. 30c
Copper Bottoms . per lb. 31@32c
No copper is Sheathing except 14x10 inches, and not to exceed 34 oz. to the sq. ft.

### Tinning.

14x18 ..... per sheet 6c
All other size sheets, 2½c per square foot For tinning both sides, double the above amount.

## SCRAP IRON AND OLD METAL

DEALER'S SELLING PRICES.

| | Net Tons. |
|---|---|
| No. 1 wrought scrap..... | $24 |
| Sheet and hoop " ..... | 10@11 |
| Cast scrap, (No. 1 heavy). | 19 |
| Cast Scrap (Stove Plate). | 12 |

OLD METALS.

| | |
|---|---|
| Old copper per lb..... | 15c |
| No. 1 H. Brass per ℔ ..... | 14 |
| Heavy yellow Brass do..... | 12 |
| Light Brass per ℔ ..... | 12 |
| Scrap Zinc per ℔ ..... | 6 |
| Tea Lead per ℔ ..... | 4 |
| Heavy Lead per ℔ ..... | 3 |

## PIPE, WROUGHT.

Standard Wrought Iron Lap Welded Steam and Gas

| Inside Diameter. Inches. | Plain, Price, Per Foot. | Galvan or Enameled Per Foot. | Outside Diameter Inches. | Weight Per Foot. |
|---|---|---|---|---|
| ⅛.. | 08 | | .40 | .24 |
| ¼.. | 08 | $0 11 | .54 | .42 |
| ⅜.. | 09 | 12 | .67 | .56 |
| ½.. | 11 | 15 | .84 | .85 |
| ¾.. | 13½ | 19 | 1.05 | 1.13 |
| 1 .. | 19 | 28 | 1.31 | 1.67 |
| 1¼.. | 27 | 40 | 1.66 | 2.26 |
| 1½.. | 33 | 47 | 1.90 | 2.69 |
| 2 .. | 46 | 64 | 2.37 | 3.66 |
| 2½.. | 75 | 1 00 | 2.87 | 5.77 |
| 3 .. | 95 | 1 30 | 3.50 | 7.55 |
| 3½.. | 1 25 | 1 70 | 4 00 | 9.05 |
| 4 .. | 1 50 | 2 05 | 4.50 | 10.73 |
| 4½.. | 1 75 | 2 40 | 5.00 | 12.49 |
| 5 .. | 2 25 | 3 00 | 5.56 | 14.56 |
| 6 .. | 2 75 | 4 00 | 6.62 | 18.76 |
| 7 .. | 3 75 | .... | 7.62 | 23.00 |
| 8 .. | 4 75 | .... | 8.62 | 28.00 |
| 9 .. | 6 50 | .... | 9.68 | 34.40 |
| 10 .. | 8 00 | .... | 10.75 | 40.64 |
| 12 .. | 12 00 | .... | | 54.65 |

Discount, 62½ per cent; galvanized, 62½ per cent.

## BRASS.

Cash prices for Roll and Sheet Brass. For less quantity than 100 lbs. add 3c per lb

### High Brass.

All Nos. not thinner than to No. 28, wider than 2 in. not wider than 14 inch ..... 30c
All Nos. to No. 28, inclusive, and widths over 14 to 20 in. inclusive ..... 35c
All Nos. to No 28, inclusive, and widths over 20 to 30 in. inclusive ..... 38c
½c per lb. advance on each No. above Nos. 28 to 38, inclusive.
All Brass thinner than No. 8 is Platers' Brass at ..... 53c
Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 inches, in width wider than 2 inches .37c

### Low Brass.

4c per lb. more than High Brass.
Gilding metal 8c per lb. more than High Brass.
Platers' or Gold Metal
In Bars ..... 48c
Sawed ..... 51c
Planed or Polished... 54c

### For Slitting.

Metal in width in. to ⅛ in. to No. 28, inclusive, 1c per lb advance.
Metal, in width 2 in. to 1 in., thinner than No. 28, 2c per lb. advance.
Metal, in width ⅛ in. to ¼ in. thinner than No. 28, 5c per lb. advance.
Metal ¼ in. in width and less, 10c per lb. advance.
Any of the above widths cut to particular lengths, add 7c per pound.

## COAL,

WHOLESALE.

Wholesale f.o.b vessel at Cleveland:

| | |
|---|---|
| Carbon Hill and Monday Creek ..... | $2 65 |
| Massillon ..... | 2 75@ 2 85 |
| Brier Hill ..... | 3 25@3 75 |
| Pittsburgh ..... | 3 00 |
| Salineville ..... | 2 25 |
| Tuscarawas ..... | 2 25 |

RETAIL.—Delivered.

| | |
|---|---|
| Massillon Lump..... | $4 00 |
| " Nut ..... | 3 75 |
| Carbon Hill and Monday Creek, lump ..... | 3 75 |
| Carbon Hill and Monday Creek, nut ..... | 3 50 |

75c less on cars by car load.

| | |
|---|---|
| Anthracite Stove and Chestnut ..... | 7 15 |
| Egg and grate ..... | 6 00 |

## GLASS.

(Per box of 50 feet)

SINGLE THICKNESS

| | |
|---|---|
| 6x8 to 10x15 ..... | 7 50 |
| 11x14 to 15x24 ..... | 8 50 |
| 16x24 to 20x28 ..... | 9 75 |
| 15x34 to 24x30 ..... | 10 75 |
| 26x28 to 24x36 ..... | 11 50 |
| 26x36 to 26x44 ..... | 13 |
| 26x46 to 30x56 ..... | 14 00 |

DOUBLE THICKNESS

| | |
|---|---|
| 6x8 to 10x15 ..... | 11 7 |
| 11x14 to 15x24 ..... | 13 25 |
| 16x24 to 20x28 ..... | 15 75 |
| 15x34 to 24x30 ..... | 17 25 |
| 26x28 to 24x36 ..... | 18 50 |
| 26x36 to 26x44 ..... | 21 25 |
| 30x50 ..... | 22 50 |
| 30x52 to 30x54 ..... | 23 25 |
| 30x56 to 34x56 ..... | 25 00 |
| 34x58 to 34x60 ..... | 27 75 |
| 36x60 to 40x60 ..... | 30 00 |

Dis 60 & 15 single, 60 & 20 double

## OILS.

| Pure Oils. packages included | |
|---|---|
| Sperm, winter bleached per gal. ..... | 1 25 |
| Whale, winter bleached per gal. ..... | 68 |
| Straits ..... | 50 @ 55 |
| "A" oil for tanner's use | 35 @ 40 |
| Lard oil extra W S .... | 98 |
| do No 1 do ..... | 83 |
| do No 2 do ..... | 68 |
| Tallow oil ..... | 75 |
| Neatsfoot oil pure.... | 1.05 |
| do No 1 ..... | 90 |
| Linseed oil, raw ..... | 55 |
| do do boiled ..... | 58 |
| Cotton seed oil white.. | 64 @ 66 |
| do do yellow | 60 @ 63 |
| West Virginia lubricating 28 deg ..... | 12c@15c |
| Pure Mecca ..... | 55@ 50 |
| Paraffine oil winter pressed ..... | 25@ 30 |
| Machinery ..... | 40 |
| Engine ..... | 50 |
| Miners' oil ..... | 40@45 |
| Drilling oil ..... | 40 |

## Hides and Leather.

| | |
|---|---|
| Prime cured hides, | 7¾ |
| Green hides ..... | 6@6¼ |
| Bull, scrubby, badly scored or damaged, cured, two-thirds price. | |
| Prime dry hides ..... | 13@14 |
| Horse hides, green | $1 75@2 00 |
| Horse hides, dry ..... | $2 00@2 25 |
| Prime cured veal calf, | 12½ |
| Prime Deacon Skins, salted | 65@70 |
| Pelts, wool on .. | 32@34 |
| Fresh slaughter sheep | 30@$1 50 |
| Fresh slaughter lambs | 50@60 |
| Green calf skins..... | 13 |
| Hemlock rough..... | 23@25 |
| Oak harness ..... | 34@38 |
| Oak sole ..... | 37@40 |
| Union harness..... | 31@40 |

## Cleveland Business Directory.

**Assayers and Analytical Chemists.**

JUDSON, W, E, Ana ytical Chemist, 8 Cushing Block.

**Bolt and Nut Works.**

HOTCHKISS & GAYLORD, manuf'rs. Machine, Plow & Elevator Bolts, Coach Screws.

**Boiler Makers.**

SMITH & TEACHOUT — (Established 1857.) Boiler, Tanks, Stills etc. 439 Broadway.

**Bridge Builders.**

BUCKEYE BRIDGE AND BOILER WORKS mfrs of Arch & Truss Bridges, Boiler Tanks and Oil Stills. Bet. Wasson St. and Case Ave.

**Coal and Iron Exchange.**

JACKSON IRON CO. Iron Ore and Pig Iron. Rooms 8 and 9. Fayette Brown, Gen. Agent.

RHODES & CO. Coal, Iron Ore an Pig Iron. Rooms 1 and 2.

**Carriage Blacksmith.**

STRIEBEL, CHAS. manfac'r. of Carriages and Wagons and platform trucks. Horse shoeing and general blacksmithing .93 Woodland ave.

**Carriage Bolts.**

THE COLWELL & COLLINS NORWAY BOLT CO., manufacturers of Philadelphia Carriage and Tire Bolts.

**Church and School Furnture.**

FAULHABER, GEO. manufacturer of School and Church Furniture. Fine Hard Wood work a specialty. 203 Ontario Street.

**Custom Boots and Shoes.**

ROONEY, JOHN manufacturer of hand-made Boots & Shoes, custom made and warranted 177 Ontario Street.

**Carriage Repository.**

GREENE'S, J. O., Carriage Repository, 408 Superior street and 52, 54 & 56 Rockwell street, dealer in Fine Carriages. Repair shop in connection.

SLATER, G. A., Carriage dealer, sells the best work for the lowest price. A fine assortment always on hand. Repository 365 Euclid Avenue.

**Coal and Pig Iron.**

ANDREWS, HITCHCOCK & CO., Briar Hill Coal and Pig Iron. 122 Water Street.

**Electrical,**

ELECTRIC SUPPLY CO. manfrs and dealers in Electric Burglar Alarms, Annunciators, Cell Bells and Batteries. Telephone lines built and repaired. 145 Seneca Street.

**Fresco Artists.**

KEMMER & KUSHMAN DECORATIVE CO., Fresco Artists, Fine Modern Wall Papers. 338 Euclid ave.

**Foundries.**

BOWLER & CO., Car Wheels, Patent Chilled Frogs, and all kinds of castings. 9 Winter.

CLEVELAND MALLEABLE IRON CO., manufacturers Malleable Iron Castins.

LAKE SHORE FOUNDRY, Water and Gas Pipe, Light and Heavy Castings. Alabama st.

TAYLOR & BOGGIS, successors to H. & H. F. Taylor, Iron Founders, 65 to 73 Central Way.

VIADUCT FOUNDRY COM'Y, Aenis, Carlin & Strangward manfrs of Macbinery Castings Fine Light Castings a Specialty. Office & Works 11 13 15 and 17 Detroit Strert, near Center.

FITZSIMONS WM. & SON, Rolling Mill and Machinery castings. Rolls a Specialty. No. 435 Broadway.

**File and Saw Works.**

PARKIN, W. H. & CO., Hand-cut Files and Rasps, dealers in Disston's saws, 11 So. Water

**Flue Cleaner.**

CLEVELAND FLUE CLEANER M'F'G. CO. manufacturer of Aitchison & Doolittle's Patent Steam Flue Cleaner, 22 & 24 Power Block.

**Hotels.**

FOREST CITY HOUSE, cor. Public Square and Superior st., Terrill & Ingersoll, Props.

KENNARD HOUSE, D. McClasky, Prop.

NEW ENGLAND HOTEL, Water st., W. W. Wolcott, Prop. Refitted and refurnished.

STRIEBINGER HOUSE, between Ontario and Seneca sts. $2.00 per day. Hawley & Langton

CITY HOTEL, Seneca street. H. B. West, proprietor. $1.50 per day.

**Hides, Pelts and Leather.**

DENNISON BROS., dealers in Hides, Pelts, Furs and Tallow, 48 and 50 River street.

**Hardwood Lumber.**

MARTIN, J. T. dealer in Hardwood Lumber, Stone's Levee, near Central Way.

**Lumber.**

WOODS, PERRY & CO., manufacturers and dealers in Lumber, Lath, etc., 5 Carter st.

FISHER, WILSON & CO., wholesale lumber dealers (pine & hard wood), rough and dressed umber, timber, lath, shingles, etc. 47 Central Way

KRAUSE, C. A., & SON, wholesale and retail dealers in lumber. Yards cor. Superior and Wason and 281 Merwin streets.

## Cleveland Business Directory.

**Hardware and Iron.**

BINGHAM, WM. & CO., Hardware, Iron, Nails and Metals, 148 and 150 Water street.

CLEVELAND ROLLING MILL CO., manuf'rs. of Steel and Iron Wire and Steel Tire.

WORTHINGTON, GEO. & CO., Hardware and Dealers in Metals. Water street.

**Lime Manufacturers.**

RUSSELL LIME CO., manufacturers of White Lime; also dealers in Plaster, Cement, etc. 85 Elm street.

**Machinery and Boilers.**

CLEVELAND STEAM FURNACE CO., Engines and Boilers, cor. Detroit and Center sts.

KRITCH, K. E. Metal Pattern Maker. Small machinery repaired. Lawn Mower sharpening a specialty. 42 South Water Street.

**Machinery Depot.**

CLEVELAND MACHINERY DEPOT, (now National Machinery Depot.) The largest stock of New and Second-hand Engines, Boilers and Machinists' Tools. Shop and Warehouse corner Bond and Superior streets.

**Mercantile Agency.**

THE MERCANTILE AGENCY. R. G. Dun & Co. proprietors. 121 Superior street.

**Oil Manufacturers.**

AMERICAN LUBRICATING OIL CO., manufacturers of lubricating oils, 23 Euclid ave.

**Paints and Oils.**

MASTERS, J. N. jobber in Paints, Oils, Varnishes. Brushes, 34 Prospect st.

**Pattern and Model Makers.**

WHITTINGHAM, J. & C., Metal Pattern and Model makers 52 Canal Street.

**STAIR BUILDER.**

PFEIL, CHAS, Stair Builder; Hard Wood Mantles and Office Railing. Works, 49 & 51 Canal street, Cleveland, Ohio.

JOHNSON & PURSER, Stair Builders. and manuf'rs of Mantels, Odd Pieces of Furniture, &c. 30 West street. up stairs.

**Steel Stamps and Stencils.**

FLEHARTY, J. H. & CO., Rubber Stamps, Seals, Stencils. 197 Superior street.

**Tanners.**

GAENSSLEN BROS., Tanners, and dealers in leather, oil and shoe findings. 80 Water-st.

**Trunks and Valices.**

FABER, J. manuf. Trunk, Traveling Bags and Ladies' Fine Satchels. Sample Trunks and Cases a Specialty. 56 Public Square.

**Vessel Agents.**

WEBB, H. J. & CO., Ship Brokers and Vessel agents. 17 & 18 Board of Trade Building. 122 Water Street.

**Wood Carving.**

HERKOMMER, J., Carver and Ornamenter in Composition. 225 Erie street.

## Business Directory.

**Akron, O.**

AKRON IRON CO., manufacture best Common, Refined and Charcoal Iron.

CASCADE HOUSE, cor. Mill and Summit sts., near Depot. J. Downie, Prop.

MCNEIL, J. C., Steam Boilers, Heavy Sheet Iron Work. Repairing promptly executed.

PERKINS, C. E., dealer in Agricultural Implements, machinery, and Manufacturers' Ag'nt

TAPLIN, RICE & CO., manuf'rs. of Stoves and Hollow Ware, dealers in Tinners' Stock, etc.

WEBSTER, CAMP & LANE MACHINE CO., Founders and Machinists, 12 Main street.

**Alliance, O.**

ARLINGTON HOUSE, cor. Main and Liberty Streets. Centrally located. Sample Room for Commercial Travellers. H. S. Adams, proprietor

MCFARLAND, J. W. Engine and Machine Builder, and General Machine Jobbing

**Cuyahoga Falls, O.**

THOMAS BROTHERS, manfrs of Ohio Stone Ware. Cuyahoga Falls Stone Ware Factory, cor. Main and Broad streets,

TURNER, VAUGHN & TAYLOR, manufacture engines, presses and grinding machinery for clay; also paper, chain, wire and flour mill machinery. Send for Circulars and price list.

SNYDER, H. wholesale manufacturer of Sash, Doors, Blinds, &c. Send for Price Lists.

THE CUYAHOGA FORGE AND IRON CO., manfrs. of every description Car, Truck and Driving Axles, Forging, Shafting. &c.

**Canal Dover, O.**

HECKMAN, E., manufr. and dealer in harness leather, upper, kipp and calf. Also, manufacturer & dealer in prime English Dairy cheese. Highest market cash price paid for hides.

## Business Directory.

**Columbus, O.**

PAT. ADJUSTABLE WINDOW CURTAIN Cornice, manufactured by Strader's Curtain Cornice Works.

ROYCE & PULLING manufrs of Patent Steam Pumps for all purposes. Store room 30 High street. Works Nos. 5 and 7 Scioto street.

U. S. CARRIAGE CO. builders of fine Carriages, Buggies and Phætons. Salesrooms and Office 257, 259 and 261 Fourth street.

REYNOLDS BROS., manufacturers of hand-cut Files and Rasps. Old files re-cut. Send for Price List.

CITY BOILER WORKS, manfrs of Stationary, Portable and Locomotive Steam Boilers. All work warranted. Borger Bros. & Co.

MURRAY, HAYDEN & CO., manfrs of Malleable Iron. Cor. Randolph & West streets.

**Canton, O.**

DIEBOLD SAFE & LOCK CO., manuf'rs. Safes, Locks, Bank and Safe Deposit Works.

NOVELTY IRON WORKS, Mill work, Shafting, engines, Imperial job printing press, etc

NEW AMERICAN HOUSE, Canton. Fred. Hipp, Prop.

EBERSOLE & KAILEY, Machine and Jobbing Shops. Gearing for Patterns or Machinery a specialty. Models of all kinds made & repaired.

**Geneva, O.**

THE ENTERPRISE MACHINE CO., L. L. Crane, Pres't, manfrs of Machinists' Tools and Machinery. Gear Cutting a specialty.

**Lima, O.**

LIMA HOUSE, centrally located; telegraph office in the house. J. Goldsmith, Prop.

**Massillon, O.**

CITY CARRIAGE WORKS, P. H. Young, prop. manfact'r of Carriages, Phætons and Spring Wagons. Work warranted. Cor. Tremont & Erie.

**Painesville, O.**

NORTH AMERICAN CUTLERY CO., m'fr's of Steel Shears and Scissors—best quality.

**Ravenna, O.**

THOMPSON, T. F., dealer in Agricultural Implements, farm machinery, hardware, seeds, fertilizers, &c. Cor. Main and Prospect sts.

BALDWIN, D. L. & SON, Contractors & Builders and manfrs of all kinds of Moulding, flooring, siding, &c. Rip, Band and Scroll Sawing.

**Steubenville, O.**

DORRANCE, D. W., Tool Works, manufacturer of hand-made miners' and stone-cutters' Tools Promp attention given to mail orders.

**Sandusky, O.**

SANDUSKY WHEEL CO. manfrs. of Sarven Patent Wheels, Carriage Bodies and Seats, Plain Wood Hub Wheels, Banded Hub Wheels, Jacobs' Patent Neck Yokes.

**Toledo, O.**

BAKER, HERBERT, Machine Shop and Iron Foundry. 98 and 100 Erie street.

TOLEDO FOUNDRY AND MACHINE CO. builders of Steam Engines, Circular Saw Mills and all kinds machinery. Water St., cor. Cherry

RUSSELL IRON WORKS, manfrs. of Architectural Iron Work, castings, pulleys, shafting and steam bending machinery. Cor. Water and Lagrange streets.

STANDARD SAW WORKS, H. Bartley, manufacturer and dealer in Saws of every description All kinds of Springs made from Sheet Steel. Reaper, Hay Knives Truss Springs, &c. made to order. 92 St. Clair Street.

UNION Wooden Ware Manufacturing Co. manufacture Sewing machines, washboards, children's wagons, carts, wheelbarrows, sleds, kitchen wooden ware, &c.

HEPBURN BROTHERS, proprie. Union Boat Works. Boats of all kinds made to order. For sale or rent. Water Street foot of Cherry.

**Youngstown, O.**

BELL, EDWIN & SON, manuf. of Nail Kegs, Pat. coiled hoops, slack barrel and keg heading and oil barrel stock.

DINGLEDY, G. H. dealer in rough and dressed Lumber, Shingles and Lath.

MORTON HOUSE, formerly Maitland House. James Morton, Prop.

TOD HOUSE, cor. Diamond and Market streets. Henkel & Bowman, Props.

**Zanesville, O.**

KIRK HOUSE, William Kirk, proprietor. $1.50 per day.

**Rochester, Pa.**

OLIVE STOVE WORKS, (limited) manufacturers of Stoves and Hollow Ware.

**Erie, Pa.**

ERIE STEAM BENDING WORKS. H. G. Fink, prop'r, manufacturer of Bent Felloes, poles, snafts, bob runners, etc. Cor. 12th & Cherry.

GUNNISON, A. B., wholesale manufacturer of Wood Pumps. 233 East Twenty-Second St.

BALL ENGINE CO., limited, manufacturers of Automatic Engines of 15 to 30 horse power

NOBLE SEWING MACHINE CO. manfrs of the New Noble Sewing Machine. Send for circulars and prices.

A. B. FELGEMAKER & CO. Church Organ builders. Descriptive catalogue furnished on application.

## Business Directory.

**Titusville, Pa.**

FOSTER & MCKAY, dealers in boilers and engines, tubing, casing, old iron, rope, and all kinds of metals. Washington street, nr. Railroad.

**Meadville, Pa.**

CURRY & CO. general jobbers in Castings of al kinds.

**Oil City, Pa.**

REID, JOS. Machinist, steam engine and pump repairing. Brass and sron castings, light and heavy, made on short notice.

**Sandy Lake, Pa.**

EBERMANN, W. S. & SONS, manfrs. of the celebrated Ebermann Boiler Feeder. Send for Circulars and Price List.

**Pittsburgh, Pa.**

PRINTING PRESSES. W. A. Bunting, manufacturers' agent. Printers supplies, type, cards. 42½ Sixth Street. [Up stairs.]

BAIR & GAZZAM, practical machinists; gear cutting a specialty. Rice's Feed Water and Heater. 17 Wood street, corner First Avenue.

**Wheeling, W. Va.**

EXCELSIOR MACHINE WORKS, Redman & Co., general machinists and manufacturers of Marine and Stationary Engines, Hangers, Pulleys, Shafting, &c. Cor. 18th & Chapline streets.

**Louisville, Ky,**

HAIGHT, ROBERT. Gold, Silver and Nickel Plating and Brass Finishing Shop. Car Trimmings and Steamboat work a specialty. 1 West Market street

**Union City, Ind.**

LAMBERT, J. W. & CO., mfrs of fork, rake, hoe and broom handles; spokes, hubs, whiffletrees, yokes, plow-rounds, &c. Correspondence solicited

**Olean, N, Y.**

MYRICK BROS. & CO., manufact'rs Engines and Boilers, oil drilling tools, rig irons, etc.

**Rochester, N, Y.**

GOWE, JNO. N., mfrs. of Specialties, such as Machine forging, bridge bolts and trusses, railroad switches. spike, mall, chisels, &c.

ELEVATORS for Hotels, Factories and Private Houses. J. S. GRAHAM & CO.

KELLY, PETER, Boiler Maker, Mill street, cor. Furnace. Sheet iron work made to order

WOOD-WORKING MACHINERY. Send for Catalogue. J. S. GRAHAM & CO.

KINGSBURY, G. J., Cracker and Oven Machinery Works. Shawmut Building, Mill St.

WISEMAN, Albine, manufacturer of all kinds of Shoemakers' Tools. 117 North Water St.

ULSCHT & LINN mfrs of Wood Lathes, Engraving Machinery. &c 131 N. Water street

RAZOR STROPS. Sole mfrs. of all kinds of Razor Strops. Ulscht, Linn & Co. 131 N. Water

**Buffalo, N. Y.**

SANDS, PAUL, Marine and Stationary Steam Engine Works mfr. of drilling machines, foot and power lathes. 70 Columbia street.

EMPIRE STATE MF'G CO., O. F. Swift, prop'r. manfr of Fluters, Sad Irons, Spun Copper & Half Copper Tea Kettles. Washington, cor. Ohio

WHITE, L. & I. J. manfrs of Coopers' Tools, Carpenters Tools, Draw Shaves, Cleavers Choppers, Ship Tools, &c. 312 Exchange street.

THE BUFFALO NUT AND BOLT CO [Limited.] Manufrs. of Hot Pressed Nuts, Bolts, Washers, Rivets, &c. No. 226 Ohio Street.

**Rheims, N. Y.**

GREAT WESTERN CHAMPAGNE. Finest made in America. Equal to best imported. Has taken highest awards everywhere, and is used all over the Continent. Try a case, and you will have no other. Pleasant Valley Wine Co., Rheims, N. Y.

**Brattleboro', Vt,**

A JOY FOREVER!

**ESTEY ORGANS**

Manufactured by

**J. ESTEY & CO.,**

Brattleboro', Vt.

(Catalogue free on app'ication.)

H. C. CHANDLER

Engraver on Wood

Cor. Circle & Market Sts.

JOURNAL BUILDING INDIANAPOLIS, IND.

CLEVELAND

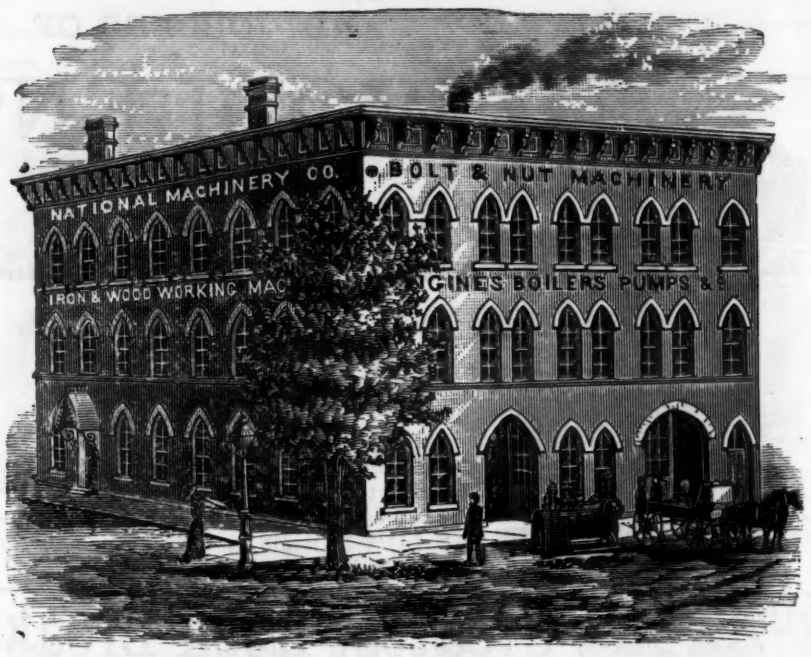
ELECTROTYPE

FOUNDRY

55 FRANKFORT STREET CLEVELAND, O. 55

To Whom it may Concern:

# The National Machinery Comp'y




Corner Superior, Bond and Rockwell Streets, Cleveland, O.,

On account of want of room and facilities to overtake their orders, are

**OPEN TO NEGOTIATE WITH ANY TOWN WELL LOCATED**

RAILROAD FACILITIES, COAL, ETC., for the REMOVAL OF THEIR WORKS. Employing over ONE HUNDRED mechanics, with a $5,000 monthly Pay Roll, they could guarantee, with larger accommodations and as soon as men could be had, to run about Two Hundred Hands, and in the future to increase this number. They propose having

**THE BEST TOOL SHOP IN THE WEST,**

and to run on the LATEST and MOST APPROVED METHODS. The high quality of their manufactures calling for first-class mechanics, will make them a desirable addition to any place.

**Being the only Specialists in the United States in their Line they are comparatively independent of location for business.**

ADDRESS, The National Machinery Company,
Office and Wareroom, Superior, Bond and Rockwell Streets, Cleveland, Ohio.

THE LECHNER ANTI-FRICTION ROLLER AND DETACHABLE CHAIN.

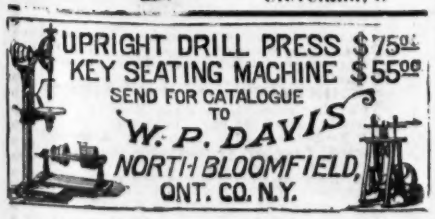
CHAIN BELTING FOR TRANSMITTING POWER. The only medium made that will transmit so nearly ALL the power applied. No slipping nor lost motion. Especially adapted for driving HEAVY SHAFTING, ROLLER TRAINS in ROLLER and RAIL MILLS, TRACTION ENGINES, AGRICULTURAL MACHINERY, ELEVATORS, DRAGS, HOISTS, DREDGING MACHINES, LIFTING CRANES, ELEVATING NUT, SLACK and PEA COAL, SAWDUST and TAN BARK CARRIERS, &c., &c., &c., manufactured and sold by the **LECHNER MANUFACTURING CO., Columbus, O.** Also manufacturers of the LECHNER COAL MINING MACHINES, and power ROTARY COAL DRILLS. For further information send for Circulars.

G. M. HEARD & CO.

**Gold, Silver & Nickel Platers**

**109 Ontario Street.**
CLEVELAND, O.

**JUDSON'S PATENTED**
SECTIONAL
**Assay Furnaces**
AND APPLIANCES.
**Model Furnace for 1881,**
All steel, light and durable, with Revolving Grate, etc. Also
**Judson's Practical Stoking Attachment**
Guaranteed to feed coal, coke or charcoal without choking the draft.
Manufactured only by the patentee,
W. E. JUDSON,
Cleveland, O



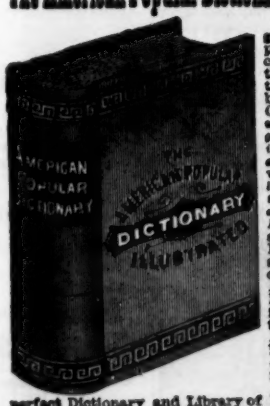

**Glazed Windows.**

CLEVELAND WINDOW GLASS CO.
**For Doors, Sash, Blinds and Windows,**
American, French & Plate Glass
**73 Michigan Street and 132 Champlain Street.**
Cleveland, Ohio.

**NIAGARA STAMPING AND TOOL CO.,**
Manufacturers of
**Power and Foot Presses,**
Dies and Tools
FOR WORKING
**Sheet Metal and Wire.**

**FRUIT CAN**
And Tinners' Tools, &c.
**Nos. 147 and 149 Elm Street,**
BUFFALO, N. Y.

**The American Popular Dictionary. $1 Only.**

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***Our readers will find this wonderful book the cheapest Dictionary published. The information it contains is worth many times the amount asked for it, and it should be in the possession of every body. With this book in the library for reference, many other much more expensive works can be dispensed with, and ignorance of his country, history, business, laws, etc., is inexcusable in any man. Note price, $1, post-paid.***

## TRAVELERS' REGISTER.

### Lake Shore & Michigan Southern.

Trains marked with a * are the only trains that arrive and depart in this city on Sundays.

EAST BOUND TRAINS.

| | Arrive. | Depart. |
|---|---|---|
| No. 20 Limited Express | *1:35 A.M | *1.50 A.M |
| No. 6 Atlantic Express | *7:05 | *7.30 |
| No. 10 Buffalo Accom. | 11:00 | 11.15 |
| No. 8 C. & St. L. Exp. | *2:25 P.M | *2.55 P.M |
| No. 4 Special N. Y. Exp. | 10:10 | 10.35 |
| No. 2 San. Div. Accom. | 10:12 | |
| No. 12 Conneaut Accom. | | 4.50 |
| Nottigham Accommodation (Sundays only) | 10.05 A.M<br>4 45 P.M | 9.00 A.M<br>2.15 P.M |
| No. 18 Elyria Accom. | 8.50 A.M | |

WEST BOUND TRAINS.

| | Arrive. | Depart. |
|---|---|---|
| No. 13 Mich. Accom. | | 6.40 A.M |
| No. 1 Special Chicago Ex. | *6.35 A.M | 7.00 |
| No. 3 Toledo Express | 1.25 P.M | 3.30 P.M |
| No. 21 St. Louis Express | *1.40 | *2.05 |
| No. 5 Pacific Express | *7.05 | *7.35 |
| No. 11 Conneaut Accom. | 8.40 A.M | |
| No. 19 Pt. Clinton Accom. | | 5.00 |
| No. 7 Michigan Exp. | *2.50 A.M | *3.05 A.M |
| No. 17 N.Y. & Chi. Ex. | 12.23 P.M | 12.33 P.M |

### Cleveland, Columbus, Cincinnati & Indianapolis.

ARRIVALS.

| | |
|---|---|
| No. 2 Col. & Cin. & Ind'pous Ex. | *7 10 A.M |
| No. 8 C. T.V. & W. & Clev. Accom. | 10 30 |
| No. 12 St. Louis & New York Exp. | *3 00 P.M |
| No. 4 Special Cin. & New York Exp. | *3 40 |
| No. 10 Wheeling & Cleveland Exp. | 7 15 |
| No 6 Indianapolis & Columbus Exp. | 10 20 |

DEPARTURES.

| | |
|---|---|
| No. 1 Cincinnati & Columbus Exp. | 8 00 A.M |
| No. 11 Cleve, Indianap. & Wheel'g Ex. | 7 10 |
| No. 3 St. Louis & Cincinnati Ex | †2 00 P.M |
| No. 5 Night Express. | *7 25 |
| No. 7 C.T.V. & W. & Col. Accom | 4 00 |

†This train runs daily to Indianapolis and St. Louis, and daily, except Sunday, to Cincinnati.

### Cleveland, Tuscarawas Valley & Wheeling.

ARRIVALS.

| | |
|---|---|
| No. 4 Wheeling & Cleve'd Exp. | 7 15 P.M |
| No. 2 Uhrichsville Accom. | 10 30 A.M |

DEPARTURES.

| | |
|---|---|
| No. 1 Wheeling & Cleve'd Exp. | 7 10 A.M |
| No. 3 Uhrichsville Accom. | 4 00 P.M |

### New York, Pennsylvania & Ohio.

ARRIVALS.

| | |
|---|---|
| No. 7 Mahoning Valley Accommo. | 10 55 A.M |
| No. 3 New York Express, | *7 00 P.M |
| No. 1 New York Express, | 6 50 A.M |
| No. 3 Pittsburgh Express, | *7 00 P.M |
| No 5 Pittsburgh Express, | 2 00 |
| New York Express | 2 00 |
| No. 9 Youngstown and Pitts. Local | 10 15 |

DEPARTURES.

| | |
|---|---|
| No. 12 New York Express, | *7 10 A.M |
| No. 4 Youngstown Local, | 11 00 |
| No. 8 Mahoning Accommodation, | 4 25 P.M |
| No. 2 New York Express, | 10 45 |
| No. 12 Pittsburgh Express, | *7 10 A.M |
| No. 6 Pittsburgh & Main Line Express | 2 30 P.M |

### Cleveland & Pittsburgh.

| | ARRIVE. | DEPART |
|---|---|---|
| Mail | 1 45 P.M | 8 50 A.M |
| Express | 6 55 | 2 30 P.M |
| Alliance Accommodation | 10 15 A.M | 3 45 |
| Ravenna Accommodation | 8 35 | 5 35 |
| Night Express | 6 30 A.M | †11 40 P.M |

† Night Express runs daily, except Saturday, by way of Wellsville, and on Saturday by way of Alliance.

### Valley Railway.

| ARRIVE. | | DEPARTURES. | |
|---|---|---|---|
| No. 2 Accom. | 10 15 A.M | No. 1 Mail | 8 15 A.M |
| No. 6 Express | 1 35 P.M | No. 3 Accom. | 2 20 P.M |
| No. 4 Mail | 6 30 P.M | No. 5 Exp. | 6 05 |

Special trains leave on Sunday at 8.30 A. M. and 4.20 P. M., arriving at Cleveland at 10 A. M. and 6.25 P. M.

Trains leave from Depot foot of South Water Street.

### Connotton Valley Railway.

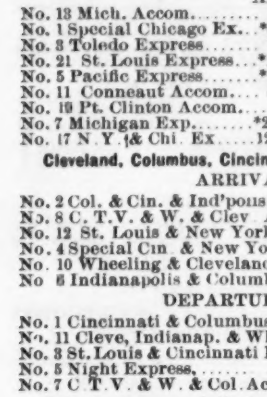
| Arrive. | | Depart. | |
|---|---|---|---|
| No. 1 | 10 05 A.M | No. 4 | 4 05 P.M |
| No. 3 | 7 15 P.M | No. 2 | 0 15 A.M |

All trains arrive and leave depot corner Commercial and Fifth Streets

### Cleveland, Akron & Columbus Railroad,

Cleveland, Akron & Columbus Railroad, running over Cleveland & Pittsburgh Railroad to Hudson, for Akron, Columbus, etc.

| | ARRIVE. | DEPART. |
|---|---|---|
| Mail | 1 15 P.M | 8 00 A.M |
| Express | 7 25 | 1 10 P.M |
| Accommodation | 10 10 A.M | 3 45 P.M |

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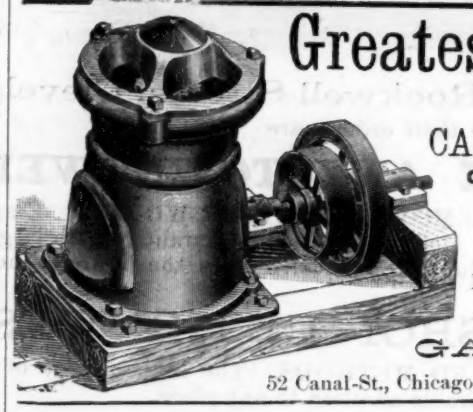

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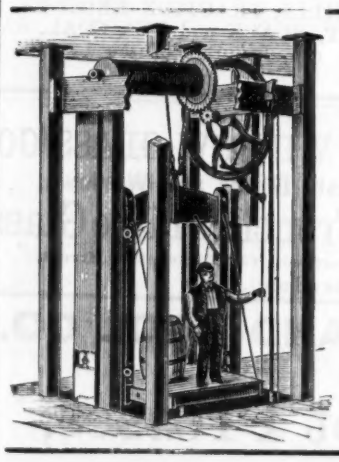

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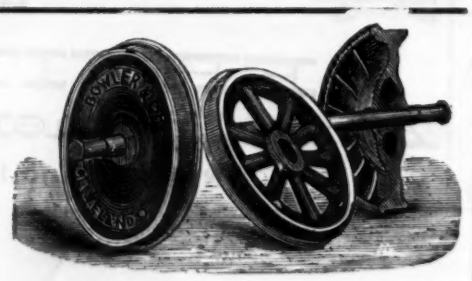




## Blue Grass Route of Ohio

### TIME TABLE.

The Cleveland, Mt. Vernon and Delaware RAILROAD.

GEO. D. WALKER, RECEIVER.

Schedule No. 5--Dating from Sunday, June 4.

SOUTH-BOUND TRAINS.

| STATIONS. | Accom | Accom | Expr | Mail | Sunday only |
|---|---|---|---|---|---|
| Leave. | P.M. | P.M. | P.M | A.M. | P.M |
| Cleveland | 5.30 | 3.45 | 2.30 | 8.50 | |
| Hudson | 6.53 | 5.02 | 3.35 | 10.10 | 4.20 |
| Cuyahoga Falls | 7.11 | 5.30 | 3.58 | 10.28 | 4.40 |
| Akron | 7.23 | 5.46 | 4.10 | 10.42 | 4.10 |
| *North Portage | P.M | 6.00 | 4.24 | 10.54* | 6.14 |
| Clinton | ..... | 6.19 | 4.44 | 11.09 | 5.31 |
| Warwick | ..... | 6.29 | 4.49 | 11.14 | 5.37 |
| *Marshallville | ..... | 6.43 | 5.02 | 11.27* | 5.50 |
| Orrville | ..... | 6.58 | 5.14 | 11.42 | 6.03 |
| *Apple Creek | ..... | 7.17 | 5.52 | 11.58* | 6.22 |
| Fredricksburg | ..... | 7.32 | 5.45 | 12.11 | 6.37 |
| *Holmesville | Accom | 7.43 | 5.55 | 12.21* | 6.48 |
| Millersburg | 7.55 | 6.08 | 12.34 | | 7.00 |
| | A.M | P.M | | | A.M. |
| Millersburg | 5.50 | ..... | 6.08 | 12.34 | 7.00 |
| *Killbuck | 6.02 | ..... | 6.20 | 12.47* | 7.13 |
| *Black Creek | 6.14 | ..... | 6.31 | 12.59* | 7.25 |
| Gann | 6.33 B<br>6.53 S | ..... | 6.51<br>7.11 S | 1.19 | 7.47 |
| Danville | 7.04 | ..... | 7.20 | 1.29 | 7.59 |
| Howard | 7.13 | ..... | 7.29 | 1.38 | 8.10 |
| Gambier | 7.22 | ..... | 7.38 | 1.47 | 8.20 |
| Mt. Vernon | 7.35 | ..... | 7.51 | 2.00 | 8.33 |
| *Bangs | 7.45 | ..... | 8.01 | 2.1* | 8.45 |
| *Mt. Liberty | 7.53 | ..... | 8.09 | 2.28* | 8.54 |
| Centerburg | 8.05 | ..... | 8.18 | 2.30 | 9.04 |
| *Condit | 8.19 | ..... | 8.32 | 2.41* | 9.19 |
| *Sunbury | 8.27 | ..... | 8.40 | 2.51* | 9.28 |
| *Galena | 8.32 | ..... | 8.45 | 2.58* | 9.34 |
| Westerville | 8.48 | ..... | 9.00 | 3.15 | 9.50 |
| Arrive at Columbus | 9.15 | | 9.25 | 3.40 | 10.20 |
| | A.M | | P.M. | P.M | A.M |

NORTH-BOUND TRAINS.

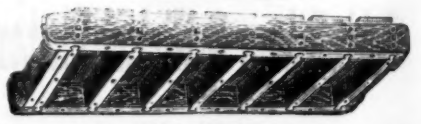
| STATIONS. | Expr | Mail | Accom | Accom | Sunday only |
|---|---|---|---|---|---|
| Arrive at | P.M | P.M | A.M | A.M | P.M |
| Cleveland | 1.45 | 6.55 | 10.15 | 8.0 | |
| Hudson | 12.35 | 5.48 | 8.53 | 7.15 | 10.3 |
| Cuyahoga Falls | 12.16 | 5.30 | 8.32 | 6.58 | 9.41 |
| Akron | 12.03 | 5.17 | 8.20 | 6.45 | 9.5 |
| *North Portage | 11.46 | 5.0 * | 8.03 | A.M. | 9.54 |
| Clinton | 11.30 | 4.44 | 7.46 | ..... | 9.18 |
| Warwick | 11.25 | 4.39 | 7.37 | ..... | 9.13 |
| *Marshallville | 11.10 | 4.27* | 7.23 | ..... | 9.00 |
| Orrville | 10.57 | 4.14 | 7.10 B<br>6.40 S | ..... | 8.47 |
| *Apple Creek | 10.40 | 3.5 * | 6.22 | ..... | 27 |
| Fredricksburg | 10.25 | 3.43 | 6.08 | ..... | 8.13 |
| *Holmesville | 10.16 | 3.33* | 5.58 | Accom | 8.02 |
| Millersburg | 10.05 | 3.22 | 5.45 | 7.50 | |
| | | | A.M. | P.M | P.M |
| Millersburg | 10.05 | 3.22 | ..... | 8.35 | 7.25 |
| *Killbuck | 9.51 | 3.08* | ..... | 8.23 | 7.13 |
| *Black Creek | 9.39 | 2.57* | ..... | 8.11 | 7.0 |
| Gann | 9.17 | 2.36 | ..... | 7.49 | 6.38 |
| Danville | 9.07 | 2.27 | ..... | 7.39 | 6.25 |
| Howard | 8.58 | 2.18 | ..... | 7.29 | 6.14 |
| Gambier | 8.49 | 2.09 | ..... | 7.14 | 6.03 |
| Mt. Vernon | 8.37 | 1.57 | ..... | 7.02 | 5.51 |
| *Bangs | 8.22 | 1.46* | ..... | 6.46* | 5.37 |
| *Mt. Liberty | 8.14 | 1.31* | ..... | 6.37 | 5.28 |
| Centerburg | 8.05 | 1.22 | ..... | 6.28 | 5.17 |
| *Condit | 7.51 | 1.09* | ..... | 6.14 | 5.03 |
| *Sunbury | 7.42 | 1.01* | ..... | 6.06 | 4.53 |
| *Galena | 7.37 | 12.56* | ..... | 6.00 | 4.47 |
| Westerville | 7.20 | 12.40 | ..... | 5.43 | 4.30 |
| Leave Columbus | 6.55 | 12.15 | ..... | 5.15 | 4.00 |
| | A.M. | P.M | | P.M | P.M |

* stop on signal. B Breakfast. S Supper.

Special Round trip rates will be made for Sunday trains.

N. MONSARRAT, Gen'l Supt. Akron, O.
E. T. AFFLECK, General Passenger Ag't. Columbus, O.


D. J. C. ARNOLI,
Manufacturer of



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**7:10A.M. LIGHTNING EXPRESS,** (daily,) sleeping and hotel coaches from Leavittsburg. 8:55 a.m. To New York, Albany and Boston without change. Parlor car, Cleveland to Salamanca. Arrives at Meadville 11:20 a.m., (dinner); Franklin, 12:33 p.m.; Oil City, 1:00 p.m.; Corry, 1:00 p.m.; Jamestown, (Lake Chatauqua) 1:57 p.m.; Buffalo, 6:15 p.m.; Rochester, 8:30 p.m.; Hornellsville, 6:40 p.m., (supper); Corning, 8:25 p.m.; Elmira, 8:57 p.m.; Binghampton, 10:58 p.m.; Albany, 6:00 a.m.; Boston, 2:45 p.m.; arriving at New York, 6:50 a.m.

**10:45 P.M. NIGHT EXPRESS,** (daily except Sunday), Sleeping Coach from Leavittsburg to New York without change. Arrives at Youngstown 1:45 a.m ; Meadville, 3:50 a.m.; Corry, 5:20 a.m.; Jamestown, 6:22 a.m.; Buffalo, 9:45 a.m.; Rochester, 1:10 p.m.; Hornellsville, 11:20 a.m.; Corning, 12:53 p.m.; Elmira, 1:21 p.m.; Binghampton, 2:50 p.m.; New York, 9:25 p.m.

**2:30 P.M. PITTSBURGH EXPRESS,**— daily, through without change. Parlor Car, Cleveland to Pittsburgh, arrives at Youngstown, 5:00 p.m.; Pittsburgh, 7:48 p.m.; Washington, 7:30 a.m ; Baltimore, 8:15 a.m ; via Sharon and Sharpsville to Meadville 7:40 p.m ; Corry, 9:10 p. m.; Lakewood, 9:50 p.m.; Jamestown, 10:00 p. m.; Salamanca 11:10 p. m.

**4:25 P.M. MAHONING ACCOMMODATION,** stopping at all way stations. Arrives at Youngstown, 7:25 p.m; Sharon, 8:30 p.m; Sharpsville 8:40 p.m; connects at Leavittsburg with train No. 20 for Meadville and intermediate points, arrives at Meadville, 11:05 p.m. Pittsburgh, 10:48 p. m.

**7:10 A.M. PITTSBURGH EXPRESS,**— (daily) through without change. Arrives at Youngstown, 9:50 a.m.; Sharon, 10:55 a.m.; Sharpsville, 11:05 a.m.; Pittsburgh, 12:45 p.m. Returning, leave Pittsburgh, 4:48 a.m., 8:33 a.m., and 1:13 p.m. and 4:20 p.m.

**11:00 A.M. YOUNGSTOWN & PITTSBURGH** Accommodation, stopping at all Way Stations, arriving at Youngstown 1:50 p.m.; Pittsburgh, 6:10 p.m. Trains arrive at Cleveland, 6:50 a.m., 10:55 a.m. 2:00, p.m. 7:00 p.m., and 10:15 p.m.

☞ This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City, and intermediate points WITHOUT CHANGE. No change to Boston and New England cities.

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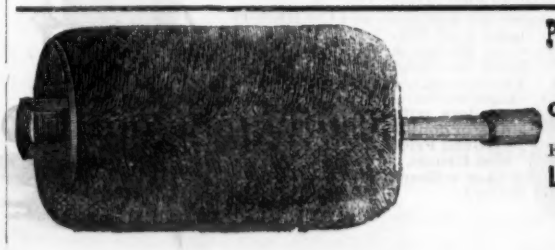

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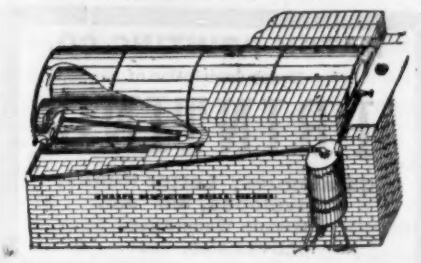

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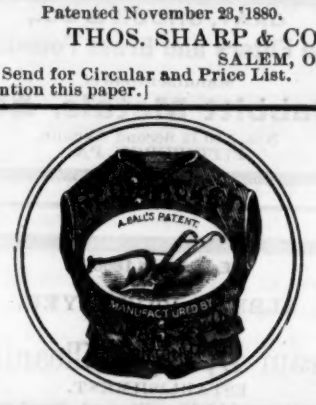

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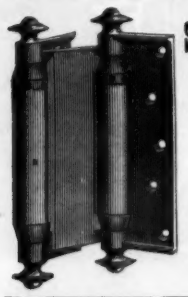
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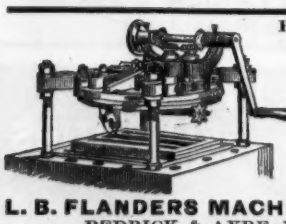
Patent Portable Valve Seat
**Rotary Planing Machine**
Descriptive Circular on application.
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Without any mechanical arrangement to absorb power, or get out of order.

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Its operation is sustained by steam pressure, brought directly upon the liquid (a cushion of air only intervening) as the forcing elements, while its subsequent condensation furnishes the lifting power.

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***It will raise, in combination with water, from 25 to 50 per cent. of mud, sand, gravel, pulp, etc.***

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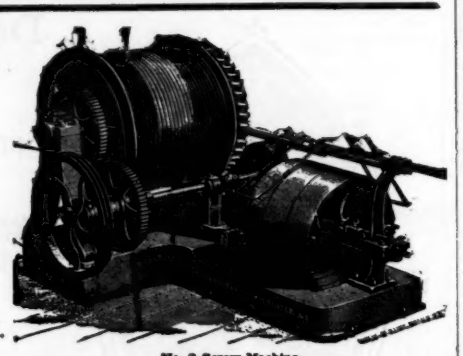
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LAKEWOOD, originally called "Lake View," from the extensive view of the Lake and vicinity, is directly on the line of the

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On the southern border of Lake Chautauqua, and is not reached by any other railway.

The through New York, Niagara Falls, Boston and Saratoga Express trains pass directly through this beautiful and popular resort, and all trains stop regularly at Lakewood Depot to deliver and take on passengers. Conductors are instructed to give stop-over checks on all through tickets, whether reading good for stop-over or not This should be understood as giving passengers the right to reach Lakewood in through cars, and when they are ready to resume their journey they can step right into one of

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This cannot be done by any other route, as no other road runs through cars or Palace Sleeping Coaches to or through any place on Lake Chautauqua.

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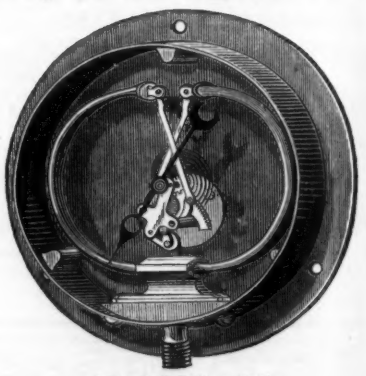
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